

## CHAPTER 13:

# MATERNAL, INFANT AND CHILD NUTRITION

## 12.1 Introduction of the Unit of Learning / Unit of Competency

This unit specifies the competencies required to manage maternal and child nutrition. It involves advising on nutrition requirement during pregnancy, managing preterm and low birth weight baby manage challenges in maternal child nutrition, providing nutrient supplementation in pregnancy and childhood and documenting maternal and child nutrition care

## 13.2 Performance Standard

By the end of this unit of learning, the trainee should demonstrate ability to analyse the scope of maternal, infant and young child nutrition based on WHO maternal and child guidelines, advice mothers on nutrition requirement during pregnancy based on the pregnancy stage and workplace procedures, manage preterm and low birth weight baby in accordance with national guidelines for nutrition care of premature and low birth weight infants, inform on complementary feeding and weaning commensurable with WHO guidelines and workplace procedures; manage challenges in maternal and child nutrition per nutritional needs, workplace procedures and standard operating procedures; provide nutrient supplementation in pregnancy and childhood in line with WHO and IMAM guidelines; and document maternal and child nutrition care in keeping with MOH guidelines.

## 13.3 Learning Outcomes

### 13.3.1 List of the Learning Outcomes

1. Advise on nutrition requirement during pregnancy
2. Manage preterm and low birth weight baby
3. Inform on complementary feeding and weaning
4. Manage challenges in maternal and child nutrition
5. Provide nutrient supplementation in pregnancy and childhood
6. Document maternal and child nutrition care.

## 13.3.2 Learning Outcome 1: Advise on nutrition requirement during pregnancy

### 13.3.2.1 Learning activity

Learning activity	Special instruction
<p>i) Promote adequate weight gain through sufficient and balanced protein and energy intake</p>	<ul style="list-style-type: none"> <li>➤ Consider the pre-pregnancy weight and nutrition status</li> <li>➤ Ensure you also confirm the pregnant woman's age so as to put the adolescent primigravidas on the appropriate diet</li> <li>➤ Monitor weight gain of mothers throughout the pregnancy to ensure weight gain is adequate.</li> <li>➤ Counsel mothers on adequate weight gain during pregnancy</li> <li>➤ Counsel and support pregnant mothers with inadequate or excess weight gain.</li> <li>➤ Carry out comprehensive assessment if weight gain is below the recommended range</li> </ul>
<p>ii) Encourage consistent and continued use of micronutrient supplements, food supplements or fortified foods.</p>	<ul style="list-style-type: none"> <li>➤ Emphasize on the need of micronutrients especially IFAS to the pregnant women</li> <li>➤ Advise mothers to start IFAS supplementation one month before conception to support health pregnancy and prevent neural tube defects</li> <li>➤ Give micronutrient supplements depending on nutrient needs and pregnancy stage.</li> <li>➤ Administer folate and iron supplementation for the first 180 days during pregnancy</li> <li>➤ Avoid giving vitamin A supplements to the pregnant women</li> <li>➤ Consider discussing on the appropriate time to take IFAS with women who experience a lot of nausea</li> </ul>
<p>iii) Encourage intake of variety of foods during pregnancy which contains adequate energy, protein, vitamins and minerals.</p>	<ul style="list-style-type: none"> <li>➤ Carry out dietary assessment for pregnant women</li> <li>➤ Be sure to encourage the pregnant women to take foods from each food group</li> <li>➤ Discourage pregnant women from taking junk foods like cookies, biscuits, candies, chips etc</li> <li>➤ Advise pregnant women who have diabetes on the appropriate diet which meets all their nutritional requirements</li> <li>➤ Prepare a meal plan that contain variety of foods that are nutrient dense.</li> </ul>

### 13.3.2.2 Information sheet

#### Definitions

- o *Pre-natal care*- care given to a family of child bearing age prior to conception, after conception and the period before onset of labor.
- o *Conception*- Refers to fertilization of a female ovum with a male sperm.
- o *Pre-conceptual care*- It's the care of a woman prior to conception.
- o *Peri-conceptual care*- It's the care given to a woman prior to conception up to 12-14 weeks of pregnancy (gestation).
- o *Pregnancy*: the state of carrying a developing embryo or foetus within the female body.
- o *Morning sickness*: early morning nausea common to some pregnancies
- o *Hyperemesis gravidarum*: nausea so severe as to be life-threatening
- o *Pica*: abnormal craving for nonfood substances such as starch, clay (soil), or ice.
- o *Anaemia*: condition caused by insufficient number of red blood cells, hemoglobin, or blood volume
- o *Fetal alcohol syndrome (FAS)*: subnormal physical and mental development caused by mother's excessive use of alcohol during pregnancy
- o *Gestational diabetes*: diabetes occurring during pregnancy; usually disappears after delivery of the infant
- o *Macrosomia*: birth weight of 4.5kg and above
- o *Neural tube defect*: malformations of the brain, spinal cord or both during embryonic development that often results in lifelong disabilities or death

#### PREGNANCY

During pregnancy many body changes occur in the mother and the fetus. Good maternal nutrition is important for woman's ability to conceive, optimal fetal growth & development, successful child delivery and the overall health of the baby and mother. Good dietary advice during pregnancy determining the future well-being of a child conceived. Good nutrition during pregnancy reduces childhood morbidity and mortality, and minimizes the risks of maternal death associated with pregnancy. Poor nutrition during pregnancy lead to physical, emotional and neurological disorders in the infant.

#### Weight gain during pregnancy

Adequate weight gain during pregnancy is essential for fetal growth and desired weight gain is desired upon pre-pregnancy weight using BMI criteria and pre-conception nutrition status of the woman. On average a healthy well-nourished woman should gain approximately 12-15 kg. This will translate to an average weight gain of 1.0kg per month, a minimum of 0.5kg per month for the first trimester and thereafter a minimum of 1-1.5kg per month for the last six months. Underweight are advised to gain more to avoid preterm, low birth weight and small

for gestational age babies. Obese women should gain relatively low amount of weight. A pregnant adolescent who is still growing should gain more weight than a mature woman of the same size.

The recommended index for assessing nutritional status for pregnant women is Mid-Upper Arm Circumference (MUAC).

### ***Optimal weight gain during pregnancy***

BMI before pregnancy	Ideal weight gain	Rate of weight gain after 1 <sup>st</sup> trimester
Underweight (BMI<18.5)	12.5-18kg	Appro. 0.5kg/week
Normal (BMI 18.5-24.9)	12-15kg	Appro. 0.4kg/week
Overweight (BMI >25)	7-11.5kg	Appro. 0.3kg/week
Obese (BMI>30)	<7.0kg or 6kg	Appro. 0.3kg/week
Twin pregnancy	16.0-20.5kg	
Adolescent pregnancy	Upper end of recommended values	

Source: *Maternal, Infant and young child nutrition, MOH, 2013.*

### ***Recommended weight gain during pregnancy***

Pregnancy state (if pregnancy weight was)	Recommended weight gain in Kg
Normal	11.5 -16.0
Overweight	7-11
Obese	5-9

### ***Average distribution of weight during pregnancy***

Composition of weight gain	Weight (kg)
Infant birth weight	3.5
Placenta	0.7
Increased maternal blood volume	18
Increased maternal fluid volume	1.8
Increased breast size	1
Increased uterine size	1-1.5
Amniotic fluid	1
Maternal fat stores	3-4.5

Weight gain in the first trimester should be 1-3kg. Second trimester and third trimester should be ½ to 1 kg per week. A higher weight gain is not desirable and is associated with pregnancy complications. Early postnatal nutrition interventions during the first two years of life is critical for brain development and has been shown to have a substantial impact on clinically important outcomes, including long term neuro development.

### **Nutrient requirements during pregnancy**

#### ***a) First trimester***

This is a time of rapid cell division, organ development and preparation for the demands of rapid fetal growth that occur during 2nd and 3rd trimesters

Critical nutrients during this phase include;

- Protein: Provide 55g+7.5g=62.5g for growth and maintenance of tissue and overall metabolism.
- Folic acid: provide 600mcg for synthesizing nucleotide and cell division to prevent serious birth defects
- Vitamin B12
- Iron: provide 27mg/day to help carry oxygen to cells, development and for infants iron storage
- Zinc: provide 5.5mg 1<sup>st</sup> trimester; 7mg 2<sup>nd</sup> trimester and 10mg 3<sup>rd</sup> trimester for synthesis of nucleic acids DNA and RNA and important in reproduction

#### ***b) Second and Third trimesters***

Energy intake is especially important since 90% of fetal growth occurs during the last half of gestation. Critical nutrients during this phase include;

- Protein: Provide 55g+7.5g=62.5g for growth and maintenance of tissue and overall metabolism.
- Iron
- Calcium: provide 1000mg/day for fetal bone and teeth calcification during 3rd trimester
- Magnesium
- B vitamins
- Omega-3 fatty acid, docosahexanoic acid (DHA).

### **Energy requirements during pregnancy**

Additional energy needs for normal weight women:

- 2nd trimester+360kilocalories
- 3rd trimester+470kcal
- Lactation+500kcal

The nutritionist/dietician should factor in the different energy requirements in age, body size, pre-pregnancy weight and lifestyles.

More healthy food choices include;

- Steamed fish (240kcal)+1 slice fruit (60kcal)
- Egg sandwich (185kcal)+Milk (125kcal)

### *Effects of nutritional deficiency during pregnancy*

Nutrient	Deficiency
Protein	Reduce head circumference
Folate	Miscarriage and neural tube defects
Vitamin D	Low infant birth weight
Calcium	Decreased infant bone density
Iron	Low infant birth weight and premature birth
Iodine	Cretinism(varying degree of Mental and physical retardation)
Zinc	Congenital malformation

### **Weight loss after pregnancy**

At delivery, the pregnant woman loses some weight. She then continues to lose more in the following weeks as her blood volume returns to normal and she sheds accumulated fluids. It is extremely difficult for a typical woman to return to her pre-pregnancy weight. The more the extra weight the woman gains during pregnancy, the more the likelihood of retaining and continue adding the weight. This extra weight may predispose the woman to diabetes and hypertension in the future pregnancies and chronic diseases later in life.

Eating breakfast regularly supports postpartum weight loss.

### **Exercise during pregnancy**

An active, physically fit woman experiencing a normal pregnancy can continue to exercise throughout pregnancy. However, a pregnant woman should;

- Have simple exercises like walking, swimming
- Avoid lifting heavy weights e.g. mattresses, furniture: abortion
- Avoid long periods of standing: exposes her to varicose vein
- Avoid sitting with legs crossed: impede circulation

Purpose of exercises

- To develop a good posture
- To reduce constipation & insomnia
- To reduce backache and fatigue

- To ensure good muscle tone & strengthen pelvic support
- To develop good breathing habits, ensure good oxygen supply to the fetus
- To prevent circulatory stasis in lower extremities, promote circulation, lessen the possibility of venous thrombosis

### ***Exercise guidelines during pregnancy***

Do	Don't
Begin to exercise gradually	Don't exercise vigorously after long periods of inactivity
Exercise regularly	Don't exercise in hot humid weather
Do warm up with 5 to 10 minutes of light activity	Don't exercise when sick with fever
Do at least 30 minutes of moderate physical activity	Don't exercise while on the cback after 1 <sup>st</sup> trimester
Drink water before, during and after exercise	Don't exercise amidst pain, discomfort or fatigue
Eat enough to support the needs of pregnancy plus exercise	Don't participate in activities that may harm the abdomen
Enjoy adequate rest	

However, pregnant women should also stay out of saunas, steam rooms, and hot tubs.

### **High risk factors during pregnancy**

1. **Maternal weight:** Both total weight gain and patterns of weight are important indicators of pregnancy outcomes. Weight should be gained gradually. Excessive weight gain is gaining more than one kilogram of body weight in a week (>1kg/week) while inadequate weight gain is gaining less than one kilogram of body weight in one month (<1kg/month).

2. **Pre-pregnancy BMI either < 19.8 or > 26.0:** This may lead to nutrient deficiencies or toxicities and eating disorders.

3. **Socio-economic status:** Poverty, lack of family support, low level of education, limited food availability.

4. **Lifestyle habits:** Smoking, alcohol intake or other drug use. These are associated with low birth weights, stillbirths and birth defects.

5. **Age:** Teens 15 years or younger, women 35 years or older.

#### **6. Previous pregnancies may put the mother at a nutritional risk**

- Many previous pregnancies (3 or more to mothers under age 20, 4 or more to mothers age 20 and older)
- Short intervals between pregnancies (< 1 year)

- Previous history of pregnancy-related problems
- Multiple pregnancies e.g. twins or triplets etc
- Low or high birth weight of infants

## 7. Maternal health:

- Development of pregnancy related hypertension
- Development of gestational diabetes
- Diabetes, heart, respiratory and kidney diseases, certain genetic disorders, special diets and drugs

## Complications during pregnancy

**Toxemia (pre-eclampsia)**-This is acute hypertension with proteinuria, oedema or both after the 20th week of pregnancy. For expectant women suffering from this condition;

- Restrict fat and sodium intake
- Ensure optimal protein intake in the absence of renal disease

**Oedema (that does not seem to develop to pre-eclampsia)**-this is accumulation of fluids in the body. For expectant women having edema:

- Sodium restriction or diuretics are not necessary
- Where oedema occurs on the legs, ensure that the mother sits with her legs placed on a raised surface

**Leg cramps**-This is neuro-muscular irritability caused by low serum calcium and high serum phosphate). For expectant women experiencing this condition:

- Encourage the client to reduce milk intake to reduce phosphorus intake
- Supplement with calcium
- Regular ingestion of aluminum hydroxide to prevent phosphate absorption is recommended

## Potential hazards of pregnancy

### 1. Vitamin mineral mega dose

Excessive vitamin A (more than 3,000 RE) has been known to cause malformations of the cranial nervous system and birth defects such as hydrocephaly (enlargement of the fluid-filled spaces of the brain), microcephaly (small head), mental retardation, ear and eye abnormalities, cleft lip and palate, and heart defects. Intake before the seventh week appears to be most damaging. Vitamin A is not given as a supplement in the first trimester of pregnancy. Pregnant women should take supplements only on the advice of a registered dieticians or physician.



## 2. Caffeine

Caffeine crosses the placenta and the developing fetus has limited ability to metabolize it.

Heavy caffeine use is defined as the use of 3-6 cups a day<sup>1</sup>

## 3. Weight-loss dieting

Low carbohydrate diets that cause ketosis deprive the fetal brain of the needed glucose and may impair cognitive development. Such diets lack nutrients vital for fetal growth. Regardless of pre-pregnant weight; pregnant women should never intentionally lose weight.

Pregnant mothers should be counseled on the following;

- Alcohol abuse
- Chronic disease requiring special diet
- Drug addiction
- Weight gain
- Food faddism
- Cigarette smoking
- Unwanted pregnancies
- Birth spacing

## Pregnancy during adolescence

With the increasing concern for teenage pregnancies, nutritional, physical, psychological, social, and economic demands continue to rise. The situation does not get any better after birth since the teenagers still need nurturing and financial support are held responsible for their helpless newborns.

The young woman may need prenatal health care, infant care, and psychological, nutritional, and economic counselling, as well as help in locating appropriate housing. And at this time, the young woman's family may or may not be supportive. At such a time, nutritional habits can seem to some as being of slight importance. They are, however, of primary importance. An adolescent's eating habits may not be adequate to fulfil the nutritional needs of her own growing body. When she adds the nutritional burden of a developing fetus, both are put at risk. Adolescents are particularly vulnerable to pregnancy-induced hypertension and premature delivery. PIH can cause cardiovascular and kidney problems later. Premature delivery is a leading cause of death among newborns. Inadequate nutrition of the mother is related to both mental and physical birth defects. These young women will need to know their own nutritional needs and the additional nutritional requirements of pregnancy. The government-funded WIC (Women, Infants, and Children) program can help with prenatal care, nutrition education, and adequate food for the best outcome possible. Pregnant teenagers will need much counselling and emotional support from caring, experienced people before nutritional improvements can be suggested.

## Case study

Ann is a 25 year old pregnant lady. She is 3 months pregnant and she weighs 45kgs. She is 150 cm tall. She complains of morning sickness which includes nausea and vomiting, headaches and weakness. She weighed 45kgs before conception. She has not started her antenatal clinics. She has had two previous pregnancies 4 years ago. She works as a vegetable vender.


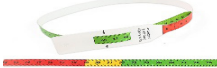
1. Determine her nutritional status.
2. Make a meal plan for her depending on her nutritional needs

### 13.3.2.3 Self-Assessment

1. The name given to an infant developing in the mother's womb is \_\_\_\_
  - A. Sperm
  - B. Fetus
  - C. Ovary
  - D. Placenta
2. High blood pressure, edema, and albumin in the urine are symptoms of \_\_\_\_
  - A. Pregnancy-induced hypertension
  - B. Anaemia
  - C. Pica
  - D. Morning sickness
3. Appropriate snacks for pregnant and breastfeeding mothers include \_\_\_\_
  - A. Fruits and raw vegetables
  - B. Potato chips and cookies
  - C. Candies
  - D. Sweetened beverages
4. Heartburn may be prevented by \_\_\_\_
  - A. Eating small, frequent meals
  - B. Lying down immediately after eating
  - C. Taking an aspirin
  - D. Increasing liquid at meals
5. Pregnant women should not take supplements of;
  - A. Iron
  - B. Vitamin a
  - C. Folate
  - D. Vitamin C

6. Define the following terms
  - A. Toxemia
  - B. Oedema
  - C. Periconceptual care
7. State the required nutrient intake and possible deficiencies associated with the following nutrients during pregnancy;
  - A. Zinc
  - B. Calcium
  - C. Protein
  - D. Folic Acid
  - E. Iron
8. State the potential hazards of pregnancy
9. How do you control obesity, toxemia and oedema in pregnancy
10. Discuss weight gain during pregnancy from the first month through the ninth. Why is an excessive weight gain during pregnancy undesirable? Is pregnancy a good time to reduce? Explain.
11. Describe the additional energy needs for normal weight women during pregnancy

#### ***13.3.2.4 Equipment, materials and resources***

<p>Weighing scales/Beam balance</p> 	<p>Adult MUAC tape</p> 
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1. WHO guidelines
2. MOH guidelines
3. Stationery
4. Skills lab
5. Use of LCDs, video clips, charts and other teaching aids

6. Invitation of competent expertise
7. Workplace procedure manuals
8. Computers with internet
9. Library and resource centre

### ***13.3.2.5 References***

Maternal, infant and Young child Nutrition. National operational guidelines for health workers, MOH 2013

Kenya National Clinical Nutrition and Dietetics Manual, MOH 2010

Ruth O., (2011) Nutrition and Diet Therapy. 10<sup>th</sup> edition

Ellie & Rolfes (2013). Understanding Nutrition. New York: Yolanda Cossio.

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### 13.3.3 Learning Outcome 2: Manage preterm and low birth weight baby

#### 13.3.3.1 Learning Activities

Learning activity	Specific instruction
i) Monitor Babies growth through regular weight taking	➤ Assess and plot the weight of the baby daily.
ii) Feed the babies	➤ Assess and determine the appropriate feeding option for the individual infant ➤ Ensure proper measurement of the fortified breast milk or formula milk according to energy and nutrient requirements and also observe feeding time. ➤ Practice appropriate sanitation techniques
iii) Monitor regularly the health status of the babies	➤ Screen the babies regularly for possible illnesses or infections
iv) Encourage Exclusive breastfeeding for the first six months	➤ Ensure proper positioning and attachment of the baby to the breast. ➤ Advise mother to ensure the baby breastfeeds for about 15minutes or more in one breast.
v) Fortify Breast milk	➤ Select most important and appropriate nutrients required for breast milk fortification. ➤ Ensure proper measurements of the nutrients are taken during fortification.

#### 13.3.3.2 Information Sheet

##### Definitions

- o **Preterm infant** – A baby born before 37 weeks of gestation have passed. The infant weighs 2500g or less during birth
- o **Term infant:** baby born between the beginning of week 38 and end of week 41
- o **Gestational age:** estimated time since conception
- o **Exclusive breastfeed** – it means the infant receives only breast milk, no other solid or liquids are given.
- o **Low birth weight (LBW) infant:** any infant born with a birth weight less than 2.5kg.
- o **Breast milk Fortification** – it is the addition of nutrients in short supply e.g protein calcium and posphates in breast milk to meet high requirements especially on preterm infants.
- o **Necrotizing enterocolitis:** an inflammatory disease of the small and large intestines combined with death of the intestinal wall.

- o **Lactation:** the period during which the mother is nursing the baby.

## Breastfeeding

### Importance of breastfeeding for the infant/young child

#### Breast milk:

- Saves infants' lives
- Human breast milk perfectly meets the needs of human infants
- Is a whole food for the infant, and covers all babies' needs for the first 6 months
- Promotes adequate growth and development, thus helping to prevent stunting
- Is always clean
- Contains antibodies that protect against diseases, especially against diarrhoea and respiratory infections
- Is always ready and at the right temperature
- Is easy to digest. Nutrients are well absorbed.
- Contains enough water for the baby's needs.
- Helps jaw and teeth development: suckling develops facial and jaw structure.

Frequent skin to skin contact between mother and child leads to bonding, better psychomotor, affective and social development of the infant.

The infant benefits from the colostrums, which protects him/her from diseases (colostrum is the yellow or golden (first) milk the baby receives in his or her first few days of life. It has high concentrations of nutrients and protects against illness. Colostrum acts as laxative, cleaning the infant's stomach).

Long-term benefits of breastfeeding include risk of obesity and diabetes.

### Importance of breastfeeding for the mother

- Breastfeeding is more than 98% effective as a contraceptive method during the first 6 months if her menses/period has not returned.
- Putting the baby to the breast immediately after the birth facilitates the expulsion of placenta because the baby's suckling stimulates uterine contractions.
- Breastfeeding reduces the risks of bleeding after delivery.
- When the baby is immediately breastfed after birth, breast production is stimulated.
- Immediate and frequent suckling prevents engorgement.
- Breastfeeding reduces the mother's workload (no time is involved in going to buy the formula, boiling water, gathering fuel, or preparing formula).

- Breast milk is available at anytime and anywhere, is always clean, nutritious and at the right temperature.
- Breastfeeding is economical: formula costs a lot of money, and the non-breastfed baby or mixed-fed baby is sick more often, which brings costs for health care.
- Breastfeeding stimulates a close bond between mother and baby.
- Breastfeeding reduces risks of breast and ovarian cancer.

### **Importance of breastfeeding for the family**

- Mothers and their children are healthier
- No medical expenses due to sickness that other milks could cause
- There are no expenses involved in buying other milks, firewood or other fuel to boil water, milk or utensils.
- Births are spaced if a mother is exclusively breastfeeding in the first six months, day and night, and if her menses/period has not returned.
- Time is saved because there is less time involved in purchasing and preparing other milks, collecting water and firewood, and there is less illness-required trips for medical treatment.

Note: families need to help mother by helping with non-infant household chores.

### **Importance of breastfeeding for the community/nation**

- Healthy babies make a healthy nation.
- Savings are made in health care delivery because the number of childhood illnesses are reduced, leading to decreased expenses.
- Improves child survival because breastfeeding reduces child morbidity and mortality.
- Protects the environment (trees are not used for firewood to boil water, milk and utensils, and there is no waste from tins and cartons of breast milk substitutes). Breast milk is a natural renewable resource. Not importing milks and utensils necessary for the preparation of these milks saves money that could be used for something else.

### **Barriers to effective breastfeeding**

- Lack of confidence in mother
- Belief that breast milk is not sufficient
- Lack of adequate support system
- History of previous breast surgery
- Breast engorgement, cracked and sore nipples
- Retractable nipples

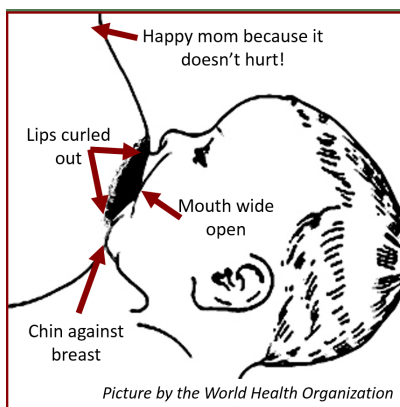
- Embarrassment by mother
- Jealousy by siblings
- Chronic illness in mother; psychosis, Cancer

### The proper way to breastfeed

- Stimulate the baby mouth to open by touching the nipple.
- Let the baby open the mouth wider.
- Bring the baby near to the breast
- Latch the baby to the breast

### Proper way to latch on

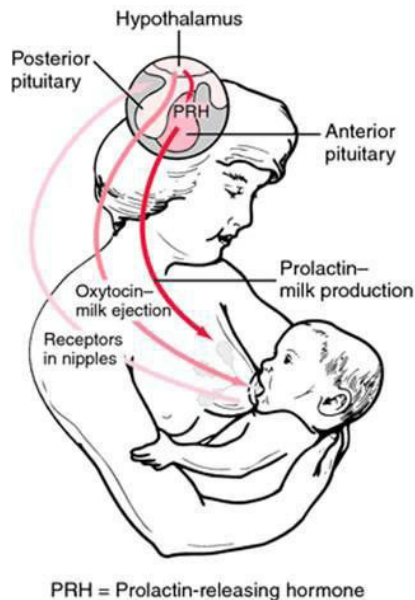
1. Baby open the mouth wider.
2. The chin touching the breast
3. The chick looked flatulent.
4. The lip are flanged out.
5. The breast looked full and round
6. Can hear the sound suck and swallow
7. The nipple looked long and round after breastfeed.



### Milk production during lactation

Oxytocin and prolactin instigate the lactation process. Prolactin is responsible for milk production, and oxytocin is involved in milk ejection from the breast. The infant's sucking initiates the release of oxytocin, which causes the ejection of milk into the infant's mouth. This is called the let-down reflex. It is a supply-and-demand mechanism.





*Prolactin and oxytocin in milk production*

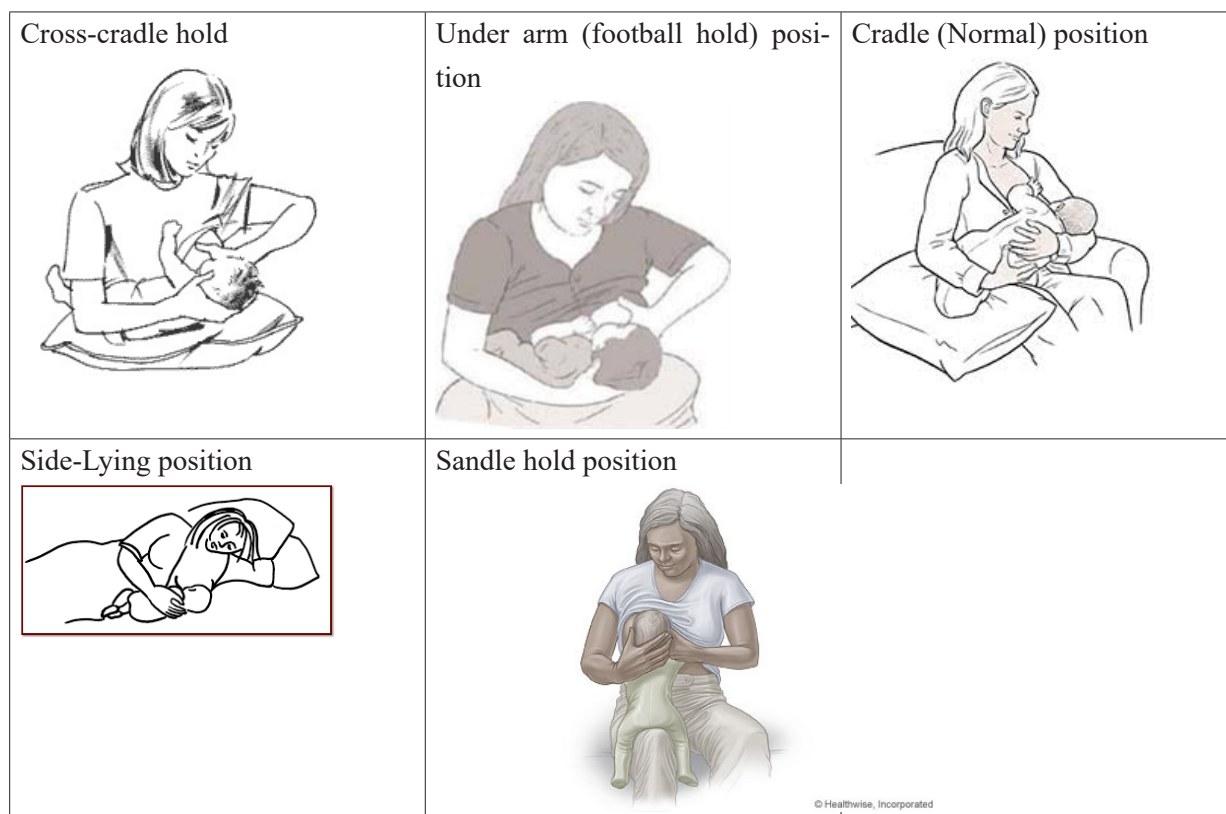
### How long to breast feed

- Newborns can nurse for 5 to 10 minute per breast; every 2 to 3 hours. This comes to about 10 to 12 feedings per day. In the beginning, there is only colostrum, and there's not very much of it, so be ready to feed often but for short durations.
- One month or more: as baby gets older, his stomach will get larger. He will nurse less frequently but for a longer duration at each feeding session. For example, he may nurse 20 to 40 minute per breast every 3 to 4 hours.
- By 6 months, Baby may breastfeed for 20 to 40 minutes per breast; 3 to 5 times per day.

### Burping baby after breastfeeding

- During and after the feeding, the infant should be burped to release gas in the stomach, just as the breast-fed infant should be burped.
- Burping helps prevent **regurgitation**.
- To burp a baby, hold him or her in one of the two positions shown and gently stroke his or her back.

## Breast feeding positions



## Counsel mothers on and practice optimal breastfeeding practices

### 1. Place infant skin-to-skin with mother immediately after birth

- Skin to skin with mother keep the newborn warm and helps stimulate bonding or closeness, and brain development this is done by assisting the mother to place the baby on her tummy immediately after delivery.
- Skin-to-skin helps the “let down” of the milk/colostrum (Colostrum is the first thick, yellowish milk that contains antibodies which protects baby from illness).
- There may be no visible milk in the first hours. For some women it even takes a day or two to experience the “let down”. It is important to continue putting the baby to the breast to stimulate milk production and let down.

### 2. Initiate breastfeeding within the first hour of birth

- *Ensure there is rooming in:* keep the baby with the mother in the same bed for unlimited breastfeeding.
- Give newborn infants no food or drinks -- no water, no infant formula (pre-lacteal feeds) other than breast milk unless medically indicated. Support the mother to attach and position the baby to initiate breastfeeding immediately within 1 hour after delivery.
- Assist the mother to breastfeed frequently from birth as it helps the baby to learn to attach and also helps to prevent the engorgement and other complications.

- In the first few days, the baby may feed only 2 to 3 times/day. If the baby is still sleepy on day 2, the mother may express some colostrum and give it from a cup.

### **Benefits of early initiation**

**Note:** Breastfeeding in the first few days;

- It facilitates milk production
- It helps in the release of oxytocin hormone which helps the uterus to contract and control post-partum bleeding.
- The baby gets colostrum which has the following benefits:
  1. Rich in antibodies – protects against allergy & infection
  2. Many white cells – protects against infection
  3. Purgative – clears meconium helping to prevent jaundice
  4. Growth factors – helps intestine to mature, prevents allergy and intolerances
  5. Rich in vitamin A – prevents and reduces severity in case of infection.

### **3. Encourage and promote exclusive breastfeeding for infants from birth up to six months (no food or drink, not even water should be given to the baby during this period)**

- Breast milk is all the infant needs for the first 6 months.
- Do not give anything else to the infant before 6 months, not even water.
- Breast milk contains all the water a baby needs, even in a hot climate
- Giving water will fill the infant and cause less suckling; less breast milk will be produced
- Water and other liquids and foods for an infant less than six months can cause diarrhoea.

### **4. Breastfeed frequently day and night**

- After the first few days, most new-borns want to breastfeed frequently, 8 to 12 times/day. Encourage the mother to frequently breastfeed as this helps to produce lots of breast milk.
- Once breastfeeding is well established, breastfeed 8 or more times day and night to continue to produce plenty of (or lots of) breast milk. If the baby is well attached, contented and gaining weight, the number of feeds is not important.
- More suckling (with good attachment) makes more breast milk.

### **5. Encourage breastfeeding on demand**

- Breastfeed on demand every time the baby wants to breastfeed

- Crying is a late sign of hunger. Encourage the mother to breastfeed every time the baby demands.
  - Advise the mother to observe the early signs that baby wants to breastfeed e.g
    - Restlessness
    - Opening mouth and turning head from side to side
    - Putting tongue in and out
    - Suckling on fingers or fists.
- 6. Let the infant finish one breast and come off by him /herself before switching to the other breast.**
- Ensure that the baby empties one breast before switching from one breast to the other as this prevents from getting the nutritious “hind milk”.
  - The “fore milk” has more water content and quenches infant’s thirst; the “hind milk” has more fat content and satisfies the infant’s hunger.

## **PRETERM AND LOW BIRTH WEIGHT (LBW) Infants**

### **Classification of preterm and low birth weight babies**

- i. Late preterm: born between 34 and 36 completed weeks of pregnancy (borderline)
- ii. Moderately preterm: born between 32 and 34 weeks of pregnancy
- iii. Very preterm: born at less than 32 weeks of pregnancy
- iv. Extremely preterm: born at or before 25 weeks of pregnancy

### **Classification for gestational age**

- i. Small for date (SFD) babies: babies with birth weight of less than 10<sup>th</sup> percentile for their gestational age.
- ii. Appropriate for dates (AD) babies: with birth weight between 10<sup>th</sup> to 90<sup>th</sup> percentile for the period of their gestation
- iii. Large for dates (LFD) babies: with a birth weight more than 90<sup>th</sup> percentile for the period of their gestational age.

### **Classification of low birth weight babies**

- i. Low birth weight (LBW) baby: neonate with birth weight of <2500g
- ii. Very low birth weight (VLBW) babies: babies with a birth weight of less than 1500g
- iii. Extremely low birth weight: neonate with a birth weight of less than 1000g and greater than 750g
- iv. Micronates: neonates weighing below 750g

- v. Intrauterine growth retardation (IUGR): Failure to sustain intrauterine growth at expected rates; can be caused by placental insufficiency, infection, malnutrition, etc.-has high chances of being born prematurely

### **Nutrition assessment for Preterm and LBW infants**

Nutrition assessment is the process of gathering or collecting nutrition and health related information to enable making sound judgement of a person's nutrition status. Assessment of preterm and LBW infants is important because it helps to:

- Measure changes in nutritional status in order to develop optimal nutritional care approaches
- Identify nutritional problems early for prompt action to prevent them from worsening
- To inform drug and fluid (feeds) administration to suit the infant

### **Monitoring growth rate of preterm and LBW infants**

The following anthropometric assessment should be assessed;

- Weight- on a daily basis
- Length- on a weekly basis
- Head circumference- on a weekly basis

**Ideal weight gain:**  $\geq 15\text{g/kg/day}$  (at 2-3 weeks after birth)

- Expect an initial weight loss of 5-15% of birth weight during the first week of life, due to loss of lung fluid, passage of urine and meconium and energy produced for maintenance of body temperature
- Birth weight should be regained at 10-14 days after birth in both preterm and term infants

**Ideal length accretion rate:** 0.8-1.0 cm/week

- Accurate length measurement is difficult to obtain

**Ideal head circumference:** 0.5-0.8 cm/week

- Changes will keep occurring from birth to week one of life due to head molding and edema. The measurements should be done weekly while the infant remains in hospital

### **1. Anthropometric assessment**

The following anthropometric measures should be assessed:

- Weight- taken on a daily basis
- Length- on a weekly basis
- Head circumference- on a weekly basis

### ***Weight, length and head circumference by gestational age for boys***

<b>Gestational age</b>	<b>Weight (kg)</b>	<b>Length (cm)</b>	<b>Head circumference (cm)</b>
40 weeks	3.4	51	35
35 weeks	2.5	46	32
32 weeks	1.8	42	29.5
28 weeks	1.1	36.5	26
24 weeks	0.65	31	22

### ***Weight, length and head circumference by gestation age for girls***

<b>Gestational age</b>	<b>Weight (kg)</b>	<b>Length (cm)</b>	<b>Head circumference (cm)</b>
40 weeks	3.4	51	35
35 weeks	2.4	45	31.5
32 weeks	1.7	42	29
28 weeks	1.0	36	25
24 weeks	0.60	32	21

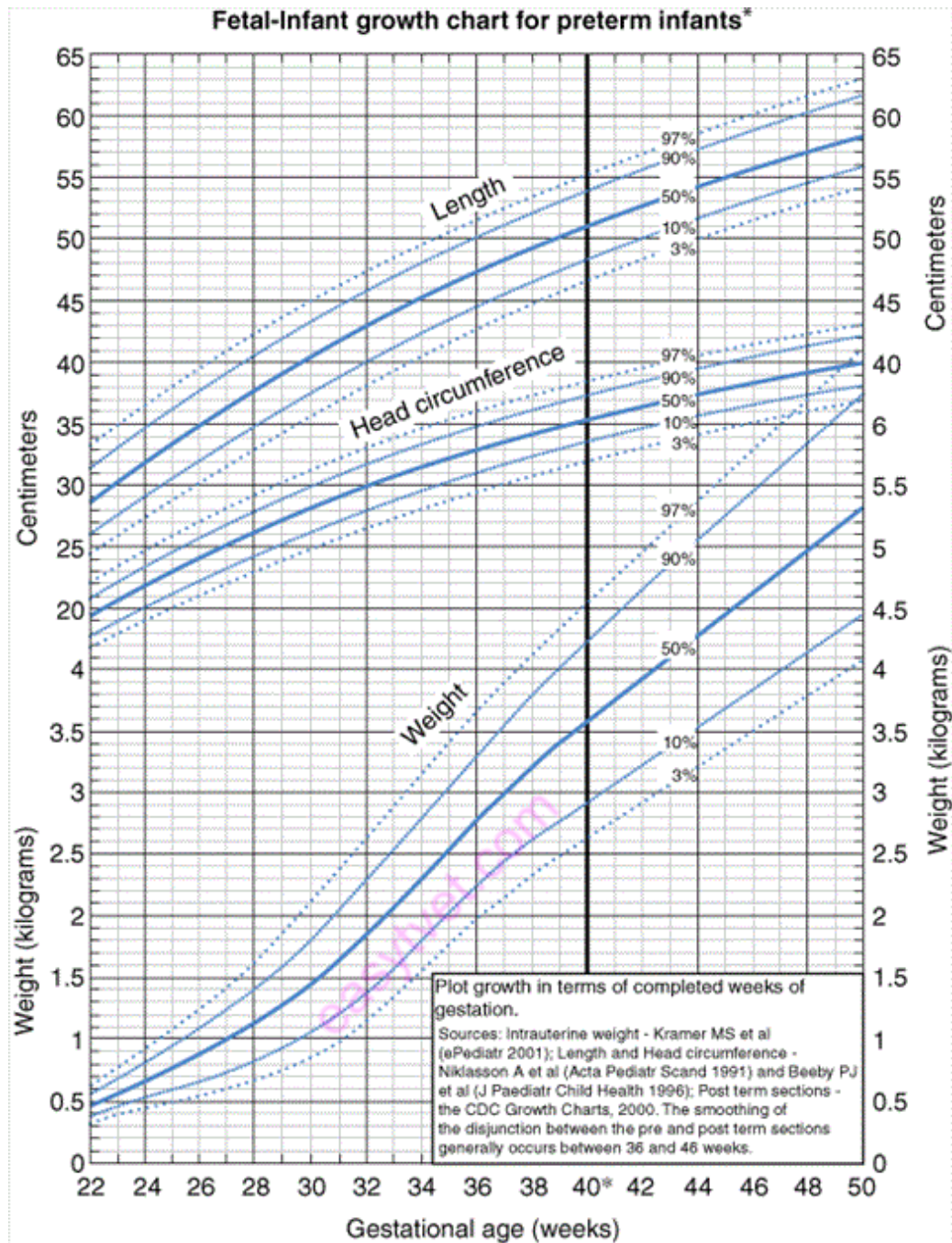
The growth chart which is recommended by most for use in assessing preterm infants is as shown in the figure on the next page.

## **2. Biochemical assessment**

Serum electrolytes, glucose, urea nitrogen and creatinine are frequently monitored during the first week because the values are usually abnormal. If the infant is on parenteral nutrition administration for more than 5 days, the following tests must be done on a routine basis;

- i) Serum albumin, urea and creatinine: 2-3 times a week
- ii) Calcium, magnesium and alkaline phosphate; once a week
- iii) Full blood count: once a week
- iv) Blood glucose: once a week
- v) Cholesterol and triglycerides: once a week
- vi) Direct bilirubin: once a week
- vii) Serum Alanine Aminotransferase: once a week
- viii) Electrolytes (Sodium, Chloride and Bicarbonate): 2-3 times a week





Source: Lowry AW, Bhakta KY, Nag PK: *Texas Children's Hospital Handbook of Pediatrics and Neonatology*; [www.accesspediatrics.com](http://www.accesspediatrics.com)

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*Growth chart for preterm infants*

### *Biochemical indicators for evaluation of the adequacy of nutrient intake*

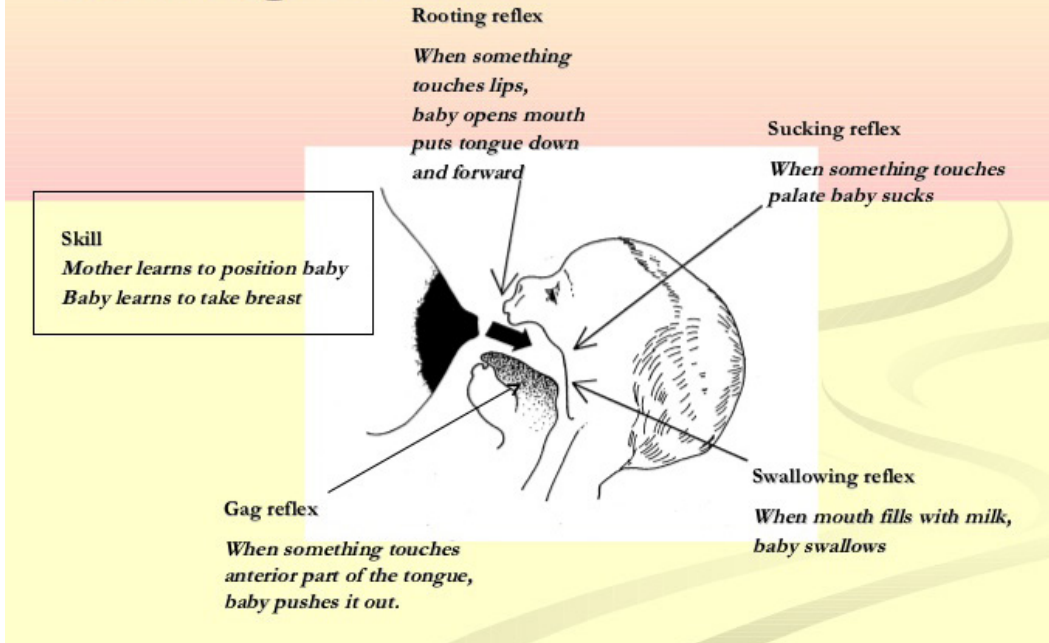
Biochemical indices	Values indicating deficiency	Interpretation
Serum Urea	<1.8 mg/dl	Insufficient nutrient intake (esp. protein)
Serum total protein	<44g/L	Insufficient nutrient intake (esp. protein)
Serum pre-albumin	<10mg/L	Insufficient nutrient intake (esp. protein)
Serum retinol binding protein	<1.05mg/dl (children's values= <sup>1/2</sup> adult values until puberty Adult values =2.1-6.4mg/dl)	Insufficient nutrient intake (esp. protein)
Serum alkaline phosphatase	<450IU/L	Insufficient nutritional intake of calcium, phosphorus and subsequent decreased bone mineral deposition
Serum Phosphatase	<4.5mg/dl	Insufficient phosphatase intake

### **Clinical features**

- General appearance: preterm infants look small and lean due to the presence of very little subcutaneous fat.
- Their skin is thin and may have a yellow pigmentation if neonatal jaundice is present. Depending on the gestational age, lanugo (fine black hair which is present on the skin of a neonate) might be present.
- Small size, with a disproportionately large head
- Sharper looking, less rounded features than a full-term baby's features, due to a lack of fat stores
- Fine hair (lanugo) covering much of the body
- Low body temperature, especially immediately after birth in the delivery room, due to a lack of stored body fat
- Labored breathing or respiratory distress
- Lack of reflexes for sucking and swallowing, leading to feeding difficulties



# Feeding Reflexes



## 4. Dietary assessment

The preterm and LBW infants' fluids, nutrients and energy intake must be assessed on a daily basis. The health worker should take note of any food intolerance which can be signaled by emesis; physical findings such as abdominal distention, tenderness and absent bowel sounds and gastric residue fluid such as stool output, change in frequency and blood stains.

The following red flags are contraindications that if practiced will lead to complications or failure to thrive;

- Infant taking preterm formula or human milk fortifier if infant is currently >1.5kgs
- Mixing formula stronger than standard dilution; mixing formula with expressed maternal milk
- Infant taking low-iron infant formula, soy formula or goat milk
- Improper formula dilution
- Mixing supplements to breast milk or formula
- Lethargy, decreased arousal during feedings
- Infant is fussy or distressed during feedings; has trouble breathing during feeding; difficult to wake for feedings or tires easily; or has difficulty finishing feeding.
- Infant refuses to eat; is difficult to feed or arches backwards when feeding, frequently gags, coughs or chokes during feeding.
- Feedings are frustrating and stressful to parent or infant
- Parents or caregivers have difficulty interpreting or responding appropriately to feeding cues
- Infant taking cow's milk before 6 months

The amount of milk taken can be evaluated more accurately by test-weighing, a procedure in which a clothed infant is weighed on an electronic scale immediately before and after breastfeeding.

Good attachment is important for effective removal of milk from the breast into the baby's mouth and for stimulation of continued breast milk production.

Premature babies, especially those born very early, often have complicated medical problems. Typically, complications of prematurity vary. But the earlier the baby is born, the higher the risk of complications.

***Risk factors associated with premature babies***

Factor	Description
1) Behavioral	<ul style="list-style-type: none"> <li>- Low pre-pregnancy weight for height</li> <li>- Smoking especially &gt;11 cigarettes per day</li> <li>- Drug and substance abuse</li> </ul>
2) Demographic	<ul style="list-style-type: none"> <li>- Age below 18 years</li> <li>- Age of first pregnancy greater than 35years</li> <li>- Less than high school education</li> <li>- Poverty</li> <li>- Non-Caucasian race</li> <li>- Unmarried</li> <li>- Underweight or overweight before pregnancy</li> </ul>
3) Reproductive system	<ul style="list-style-type: none"> <li>- Hypertension during pregnancy</li> <li>- History of infertility</li> <li>- Multi-parity &gt;5</li> <li>- No prenatal care</li> <li>- Multiple gestation</li> <li>- Placental abnormalities</li> <li>- Previous preterm birth</li> <li>- Previous still birth or neonatal loss</li> <li>- Previous first or second trimester abortions</li> <li>- Uterus abnormalities</li> <li>- Short inter-pregnancy interval</li> </ul>
4) Psychosocial	<ul style="list-style-type: none"> <li>- Domestic abuse</li> <li>- Exposure to job related teratogens</li> <li>- High stress</li> <li>- Inadequate housing</li> <li>- Strenuous job activity</li> </ul>

### **Nutritional challenges of premature and LBW infants**

- a) High metabolic rates as a result of high rate of growth and higher proportion organs like heart, liver and brain which are more metabolically active
- b) Difficulty in maintaining normal body temperature due to lack of adipose tissue
- c) Excessive water loss owing to the very thin and highly permeable skin
- d) Immaturity of renal function leading to limited capacity for concentration of urine and excretion of waste products, vulnerability to very high solute overload and dehydration and inability to maintain acid-base balance
- e) Immature digestive system:
  - Very low stomach capacity
  - Slow gastric emptying and stool passage
  - Slower upper and lower intestinal motility
  - Fragile intestines leading to high risk of necrotizing enterocolitis (NEC)
  - Immature liver hence reduced bile production
  - Deficiency of digestive enzymes
  - Immature digestion and absorption of macronutrients
  - Inability to coordinate sucking and swallowing
  - GI tract sterility hence immunologically immature
- f) Conditions affecting feeding and nutritional demand
  - Poor sucking and swallowing reflexes as they only develop at 32-34 weeks
  - Poor feed tolerance due to increased chances of aspiration
  - Fluid restrictions imposed
  - Low levels of micronutrients such as calcium, zinc, iron etc
  - Few nutrient reserves
  - Accelerated growth

### **Nutritional requirements for preterm and low birth weight infants**

The nutritional requirements of preterm and LBW babies is high compared to a term neonate

#### **Goals of nutritional management of preterm and low birth weight infants**

- i. Ensure growth and nutritional patterns similar to intrauterine growth
- ii. To provide sufficient nutrients and calories to support accelerated rates of growth and nutrient accretion equal to intrauterine rates
- iii. Improve long-term nutritional results
- iv. Prevent morbidity related to feeding options

## Guidelines on nutritional requirements

Energy and nutrient requirements are usually much higher compared to term neonates because;

- Preterm babies have not achieved the optimal deposition of nutrients in the body. The babies have not stayed in the womb long enough to build storage of nutrients (which happens in 3<sup>rd</sup> trimester) hence they must take supplements.
- Infants born at the beginning of third trimester of pregnancy often are growth restricted because of decreased intrauterine nutrient deposition
- Compositional differences exist between term and preterm human milk due to early interruption of pregnancy, variable hormonal profile, and delay in initiation of pumping, maternal anxiety and decreased milk flow.
- The nutritional needs of preterm infant exceed the content of human milk for protein, calcium, phosphorus, magnesium, sodium, copper, zinc and vitamins B12, B6, C, D, E and K and folic acid (See Table below).

### *Macro and Micronutrients recommend intakes for infants 1000g to 1500g*

Nutrient	Preterm Infant	Term infant
Energy kcal/kg/bwt	110-135	108
Protein (g)<kg bwt	4.0-4.5g/kg/day	2.2g/k/day
Protein (g)1-1.8kg bwt	3.5-4.0g/kg/day	
Fat g/kg/day	4.8-6.6g/kg/d	5.5g/100kcal
DHA (mg)/kg	≥18 (0.2 to 0.5% fat)	0.1 to 0.4%
ARA (mg)/kg	≥24 (0.3 to 0.7% fat)	0.2 to 0.7%
ARA:DHA ratio	1.2:2.1	1 to 2
CHO g/kg/day	3.4 to 4.2	11g/100kcal
Iron (mg)/kg	2 to 4	10mg/day
Calcium (mg)/kg	100 to 220	360mg/day
Phosphorus (mg)/kg	60 to 140	240mg/day
Sodium (mg)/kg	69 to 115	350mg/day
Potassium (mg)/kg	78 to 117	925mg/day
vitamin A (mcg)/kg	210 to 450	420mcg/day
Vitamin D (mcg)/kg	3 75 to 10	10mcg
Folic acid (mcg)/kg	25 to 50	30mcg/day
Vitamin C (mcg)/kg	18 to 24	35mcg/day

## Feeding options for preterm and LBW infants

The recommended types of feeds for preterm and LBW infants are;

- a. Expressed breast milk + fortifier
- b. Expressed breast milk +preterm formula milk substitute
- c. Preterm formula
- d. Breastfeeding +alternate fortified expressed breast milk

### a) Breastfeeding

It's the best method because it has many health benefits for premature babies. However, it is not always adequate for premature infant. This being the case, the following categories of infants will need breast milk fortification or supplementation to meet their nutrient requirement for a limited period before breast milk can be optimal for optimal growth and development;

- Very low birth weight
- Born between 1500 to <2000g – those unable to consume or tolerate large quantities of breast milk and those displaying inadequate growth require a breast milk fortifier- fortification for a minimum of three months post discharge is recommended and then reassess needs after that.
- Newborn infants who are at risk of hypoglycemia
- Where mother is unable to breastfeed or breastfeeding is contraindicated

Low birth weight babies as well as for babies weighing 2500g or more who have no problem breastfeeding should be initiated on the breast within the first hour of birth.

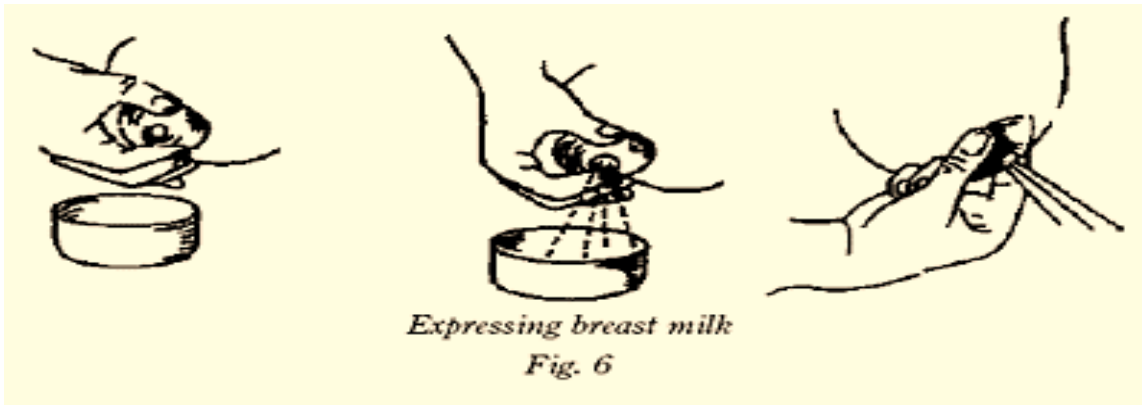
### b) Expressing milk for the premature baby

Start expressing colostrum as soon as possible after birth. This should be within 6 hour of delivery. She can then feed the baby with the colostrum drop by drop at first but can later use cup and a spoon/syringe to feed the infant instead of a bottle. The mother should express as much breast milk as she can and as often as her baby could express. This should be at least every three hours, including during the night.

During hand expression of breast milk, a mother should;

- Wash hands
- Prepare a sterile/clean container
- Gently massage breasts in a circular motion with her fingers position the thumb on the upper edge of the areola and the first two fingers on the underside of the breast behind the areola
- Press behind the nipple and areola between the finger and thumb
- Compress and release the breast with the fingers and the thumb a few times
- Press form all the sides to empty all the segments

- If no milk is expressed, move thumb and fingers towards or further away from the nipple and try again
- Repeat compressing and releasing rhythmically
- Rotate the thumb and finger positions to remove milk from other parts of the breast
- Avoid squeezing the breast, pulling out the nipple and the breast, and sliding the finger along the skin



### **Milk supply and demand**

Removal of milk helps to stimulate milk production. The amount of milk removed at each feed determines the rate of milk production in the next few hours. This then means that it is critical to remove continue removing milk even when mother and baby are separated in order to maintain supply.

To keep up with her milk supply, the mother should express at least every three hours. To build up her milk supply if it seems to be decreasing, the mother should express ever 1-2 hours during the day and at least three hours during the night.

### **Stimulating oxytocin reflex**

Oxytocin works better when the baby is suckling than when expressing. A mother needs to know how to help her oxytocin reflex when expressing the milk.

- Help the mother psychologically:
  - Build her confidence
  - Try to reduce any sources of pain or anxiety
  - Have good thoughts and feelings about the baby
  - Advise her to sit quietly and privately or with a supportive friend
  - Hold her baby with skin-skin contact if possible (she can hold her baby on the lap as she expresses or even look at its photograph)
- Advise her to warm her breasts: she can take a warm shower or massage the breasts with warm water

- Encourage her to stimulate her nipple either by gently pulling or rolling her nipples with her fingers
- Encourage her to massage or stroke her breasts lightly using fingers, closed fist or a comb
- Advise her to have a helper to rub her back



### **Breast milk fortification**

All infants below 1500g require breast milk fortifier in addition to breast milk.

### **Benefits of breast milk for the preterm**

- Whey predominant protein
- Improved nutrient absorption
- Low renal solute load
- Increased Omega-3 fatty acids
- Presence of anti-infective factors
- Possible protection against NEC and late onset sepsis
- Promotion of maternal infant attachment

### **Limitations of human breast milk for preterm infants**

- Inadequate supply
- Volume restrictions
- Inadequate nutrients
- These limitations result in:
  - o Slower growth rates
  - o Decreased bone mineralization and risk of osteopenia
  - o Nutrient deficits
  - o Long-term poor neurodevelopment outcomes

The limitations necessitate the use of FHM (Fortified Human Milk) which helps achieve optimal growth and nutrition for the infant. Examples of breast milk fortifiers include; Nutripre Breast milk fortifier (Cow & Gate) .1g sachet and FM 85 (Nestle) 5g scoop/100ml

The addition of multi-nutrient fortifiers to human milk results in:

- Improvement in weight gain
- Increments in both length and head circumference in the premature infant
- Normalization of serum calcium, phosphorus and alkaline phosphatase
- Improved protein status
- Increased bone mineralization
- Improved long-term development

### c) Preterm formula

Since breast milk may not always be available, preterm infant formula may be used. This is a formula designed for premature infants, and is calorie-enriched (80kcal/100ml), protein and mineral enriched to support intra-uterine accretion rates. The formula helps to increase the rate of weight gain and head growth and improves the neurodevelopmental outcomes.

It is suggested that a preterm infant milk formula should contain calcium and phosphorus at a minimum level of 75mg/100ml and 42mg/100ml respectively (if fed at 180ml/kg/day).

### Standard procedures for personnel deployed in neonatal intensive care feed room personnel

1. Trained, skilled health workers are essential in the care setting to be in compliance with all applicable health regulations and sanitation codes
2. Do precise measurements and ensure maximum concentration when preparing formula
3. The health worker should be in good health and must practice appropriate sanitation techniques
4. Health worker should always remove all jewelry while on duty in order to prevent any possible contamination of the formula
5. All staff must follow hand hygiene per hospital
6. A short-sleeved scrub uniform should be worn under a clean gown during periods of preparation
7. Hair must be completely covered with a hair restraint
8. Artificial nails are prohibited, and nails must be short and well-manicured.



## Mode of feeding

### i) Through an IV line

It is a thin line that goes straight to the veins. Carries all the nutrient directly to blood supply. Sugar and salt solution can be given or a nutrient rich solution called total parenteral nutrition (TPN).the method depends on baby weight and how long they think it will take to establish the mother's breast milk.

### ii) Tube feeding (infants <1500g)

This feeding method is recommend for preterms with impaired suck swallow breat pattern until they can obtain adequate quantities of milk from the breast. The tube, which is very fine and soft, goes into their stomach - either through the nose and down to the back of the throat (a nasogastric tube) or through the mouth (an orogastric tube). Nasogastric tube is recommended for all neonates with breathing problems, very low oxygen levels, gagging, circulatory problems, blood infection, or other illnesses since they may not suckle.

iii) **Breastfeeding** is appropriate for stable growing infants above 2000g

iv) **Cup feeding**(infants 1500-2000g): used for those whose swallowing reflex has developed

v) Premature infants should be fed very slowly to reduce the risk of getting an intestinal infection (necrotizing enterocolitis).

## Quantity of feeds

Weight	Volume
≤1500g	80-100 ml/kg/day
1501-2000	80 ml/kg/day
Above 2000	60ml/kg/day

*Feeding frequency; 2 hourly*

## Approaches to feeding

- For preterm well babies, immediate milk feeding should be initiated at 60ml/kg/day
- For sick babies or weight <1.5kg start with 24hr IV 10% Dextrose on day 1
- Day 2, minimal enteral tube feeds may be started depending on whether the neonate is ready as per the guidelines
- Starting from day two depending on whether the infant is ready for initiation of enteral feeds, the volume is increased by 10-20ml/kg per body weight and IV fluids reduced with the same amount to keep within the total daily volume
- For bare maintenance, 150ml/kg/day is required
- Fortification is started when a volume of 150ml/kg/day is reached
- The increament should continue until a maximum volume of 240ml/kg/day fortified breast milk reached or 200ml/kg/day when using preterm formula
- Follow the paediatric protocol in administration of the bolus feeding or IV fluids

## Case study

Joseph is a two days old baby. He was born after 32 weeks with a birth weight of 1000g. The mother is HIV positive and she delivered through caesarean section. Since birth he has been in the incubator. He is reported to have difficulties in breathing and high fevers.

1. Give advice on the best feeding method to be used
2. Give formulation to be given and the nutrients to be supplemented




### 13.3.3.3 Self-Assessment


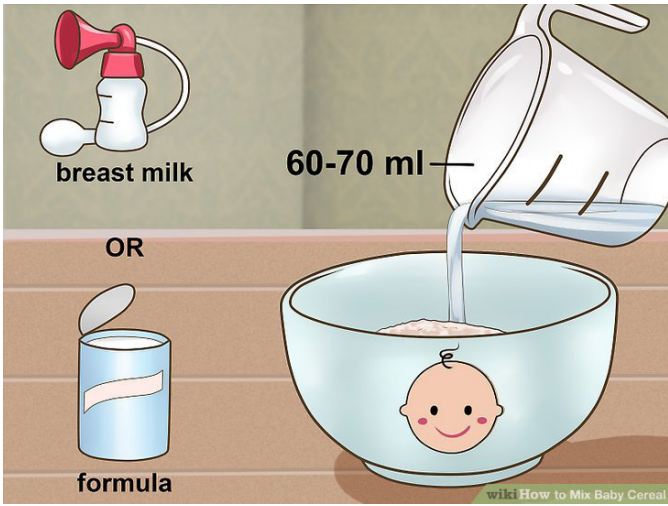


1. Define;
  - A. Preterm infant
  - B. Exclusive breastfeeding
  - C. Breast milk fortification
2. A small for date baby is a \_\_\_\_\_
  - A. Born between 34 and 36 completed weeks of pregnancy
  - B. A baby with birth weight between 10th to 90th percentile for the period of their gestation
  - C. Name given to a baby from birth up to 28 days
  - D. Babies with birth weight of less than 10th percentile for their gestational age.
3. When a \_\_\_\_\_ helps the baby to open the mouth, put the tongue down and forward when something touches the lips
  - A. Gag reflex
  - B. Rooting reflex
  - C. Swallowing reflex
  - D. Sucking reflex
4. The following methods are used to feed preterm and low birth except?
  - A. Bottle feeding
  - B. Breast feeding
  - C. Cup feeding
  - D. Parenteral feeding
5. The volume of milk recommended for low birth weight baby weighing 1800g is \_\_\_\_
  - A. 90 ml/kg/day
  - B. 80-100 ml/kg/day
  - C. 50-60 ml/kg/day
  - D. 80 ml/kg/day

6. To facilitate lactation, a mother needs ;
  - A. About 5000kcal a day
  - B. Adequate nutrition and rest
  - C. Vitamin and mineral supplements
  - D. A glass of wine or beer before each feeding
7. State the signs and symptoms of a premature infant
8. Describe the various methods of feeding a preterm baby
9. Explain the benefits and limitations of breast milk for preterm and LBW infants
10. Discuss the expression of breast milk for preterm and LBW infants

#### ***13.3.3.4 Tools, Equipment, Supplies and Materials***

1. WHO guidelines
2. MOH guidelines
3. Stationery
4. Skills lab
5. Use of LCDs, video clips, charts and other teaching aids
6. Invitation of competent expertise
7. Workplace procedure manuals
8. Computers with internet
9. Library and resource centre

<p>Weighing scale</p> 	<p>MUAC tape</p>
<p>Head circumference tape</p> 	<p>Length board</p> 

<p>Cup &amp; spoon</p> 	<p>Mixing equipment and graduated cylinders</p> 
<p>Tray</p> 	<p>Feeding Syringe</p> 

### 13.3.3.5 References

National guidelines for nutrition care of premature and Low birth weight babies, Ministry of medical services, 2013. Kenya

Maternal, infant and Young child Nutrition. National operational guidelines for health workers, MOH 2013

<https://www.mayoclinic.org/diseases-conditions/premature-birth/symptoms-causes/syc-20376730>

[https://www.who.int/nutrition/topics/complementary\\_feeding/en/](https://www.who.int/nutrition/topics/complementary_feeding/en/). Retrieved on 29<sup>th</sup> September 2019

### 13.3.4 Learning outcome 3: Inform on complementary feeding and weaning

#### 12.3.4.1 Learning Activities

Learning activity	Specific instructions
i) Obtain Dietary requirements of the babies. <ul style="list-style-type: none"><li>Review WHO guidelines on complementary feeding</li></ul>	<ul style="list-style-type: none"><li>➤ Assess the infant's readiness for solid foods</li><li>➤ Give diet guides depending on baby nutrition needs and the age.</li><li>➤ Support mothers in appropriate and optimal complementary feeding for 6 to 24 months through the use of locally available home based foods</li></ul>
ii) Observe Breastfeeding for two years as per WHO guidelines	<ul style="list-style-type: none"><li>➤ Counsel mothers on optimal breastfeeding practices</li><li>➤ Encourage the mother to exclusively breastfeed up to 6 and continue breastfeeding up to 2 years of age after starting complementary feeding.</li><li>➤ Observe the signs of good positioning during breastfeeding</li></ul>
iii) Monitor Babies growth	<ul style="list-style-type: none"><li>➤ Take and plot babies weight every month to determine growth pattern</li></ul>
iv) Supplement the babies with micronutrients as per their nutrition requirements	<ul style="list-style-type: none"><li>➤ Give vitamin A supplement at 6 months upto to 59 months.</li><li>➤ Give other supplements depending on nutritional needs of the baby.</li></ul>

#### 13.3.4.2 Information Sheet

##### Definitions

- o Complementary feeding - Complementary feeding means giving other foods in addition to breast milk. These other foods are called complementary foods.
- o Weaning - It is the process of introducing an infant to what will be adult diet while withdrawing the supply of its mother's milk.
- o Breastfeeding is the feeding of an infant or young child with breast milk directly from female human breasts (i.e., via lactation) not from a baby bottle or other container
- o Lactation, the production and secretion of breast milk for the purpose of nourishing an infant, is facilitated by an interplay of various hormones after delivery of the infant.

## Nutritional requirements

During the first year of life, infants experience the most rapid growth in one's life. An infant is expected to double its birth weight by 6 months of age and triple it within the first year. This explains why the infant's energy, vitamin, mineral, and protein requirements are higher per unit of body weight than those of older children or adults. Nutritional needs will depend largely on a child's growth rate. As nutrient requirements vary with growth rate. The infant is expected to obtain its nutritional requirements from the breast milk for the first six months.

WHO recommends that when breast milk is no longer enough to meet the nutritional needs complementary feeds should be introduced after 6 months. It is during complementary feeding when the transition from breast milk to family foods happens, a period that takes 6 to 18-24 months of age. According to WHO, infants should start receiving complementary foods at 6 months of age in addition to breast milk, initially 2-3 times a day between 6-8 months, increasing to 3-4 times daily between 9-11 months and 12-24 months with additional nutritious snacks offered 1-2 times per day, as desired.

Continuing breast milk or formula milk and introducing complementary food and drink needs to be started at six months to:

- o Provide extra energy (calories) and nutrients to sustain normal growth and optimal health and development
- o Give infants the opportunity to learn to like new tastes and textures, based on family foods, at a time when they are receptive to them, thus potentially preventing food refusal later

Complementary foods can be subdivided into:

- o Transitional foods: complementary foods specifically designed to meet the particular nutritional or physiological needs of the infant;
- o Family foods: complementary foods given to the young child that are broadly the same as those consumed by the rest of the family.

## Guidelines for feeding a baby from birth to 6 months

- Exclusive breastfeeding is recommended for the first 6 months
- Encourage parents to feed children on demand
- Encourage parents to hold and position their babies correctly during feeding and make eye contact
- If an infant is not breastfeeding infant formula is the most acceptable alternative
- Avoid fruit juice water or any beverage other than breast milk

## Introduction of complementary foods

- o One food is introduced and then no other new food for 4 or 5 days.
- o If there is no allergic reaction, another food can be introduced, a waiting period allowed, then another, and so on.

- o The typical order of introduction begins with cereal, usually iron-fortified rice, then oat, wheat, and mixed cereals.
- o Cooked and pureed vegetables follow, then cooked and pureed fruits, egg yolk, and, finally, finely ground meats.
- o Between 6 and 12 months, toast and teething biscuits can be added in small amounts. Food should also be given so as to allow the infant to learn to chew and accept a wide variety of food textures
- o Honey should never be given to an infant because it could be contaminated with *Clostridium botulinum* bacteria. Naturally sweet fruits (such as bananas) should be used to sweeten foods rather than adding sugar
- o When the infant learns to drink from a cup, juice can be introduced. Juice should never be given from a bottle because babies will fill up on it and not get enough calories from other sources.

### **Effects of early complementary feeding**

The introduction of solid foods before the age of 4 to 6 months is not recommended because;

- o The child's gastrointestinal tract and kidneys are not sufficiently developed to handle solid food before that age.
- o It is thought that the early introduction of solid foods may increase the likelihood of overfeeding and the possibility of the development of food allergies, particularly in children whose parents suffer from allergies.

### **Signs of an infant's readiness for solid foods**

1. The physical ability to pull food into the mouth rather than always pushing the tongue and food out of the mouth (extrusion reflex disappears by 4–6 months)
2. A willingness to participate in the process
3. The ability to sit up with support
4. Having head and neck control
5. The need for additional nutrients.
  - o If the infant is drinking more than 32 ounces of formula or nursing 8 to 10 times in 24 hours and is at least 4 months old, then solid food should be started.

### **Food selection for complementary feeding**

Nutritional requirements may vary from one individual to others and depends upon metabolic and genetic difference. No single food meets the essential requirements for children except mothers' milk which provides all nutritional substances to the infants till six months of age. Social and cultural influences determine dietary habits upon complementary feeding.



The child's diet should contain sufficient amount of fluids, calories, proteins, fats, carbohydrates, vitamins, minerals, and salts. Food items should be digestible palatable, attractive, choiceable and easily available

To help prevent iron deficiency, the diet should include the following:

- o iron-rich foods (meat, fish, well-cooked eggs, pulses [beans, peas, lentils], nut butters or pastes of finely ground nuts, fortified [non-organic] breakfast cereals, softened dried fruits and green vegetables).

Foods containing vitamin C will aid the absorption of iron. To help prevent iron deficiency, unmodified cow's milk should not be introduced as a main drink before 12 months of age.

There is no advantage in using follow-on formula (with a higher iron content) compared to an infant formula. However, if an infant's diet is low in iron a follow-on formula may be helpful.

Organic baby cereals are not a good source of iron since organic restrictions prevent iron fortification.

Introducing gluten between 4–7 months of age while breast-feeding may reduce the risk of coeliac disease, type 1 diabetes and wheat allergy. (Foods containing gluten are wheat, rye, barley and oats. These cereals are present in bread, wheat, some breakfast cereals and rusks)

High-allergen foods such as egg and fish do not need to be delayed until after six months as there is no evidence that this will reduce the likelihood of allergies. The risk of vitamin D deficiency between 0 and 12 months may be due to the rapid rate of bone growth. In addition, infants with dark skin who do not make enough vitamin D in their skin, or whose mothers have low vitamin D status, may also be at risk of deficiency. Vitamin A requirements are also high and about 50% of infants do not eat enough vitamin A in their food

### Complimentary Feeding at different stages

#### *Guide on quantity, variety and frequency of complementary foods*

Age	Texture	Frequency	Amount of food an average child will eat in each meal
6-8 months	Start with thick porridge, well mashed food and continue with mashed family foods	2-3 meals per day plus frequent breast feeds, Depending on the child's appetite, 1-2 snacks may be offered	Start with 2-3 tablespoons per feed increasing gradually to ½ of a 250 ml cup
9-11 months	Finely chopped or mashed foods and foods that baby can pick up	3-4 meals plus breastfeeds. Depending on the child's appetite, 1-2 snacks may be offered	½ of a 250 ml cup or bowl
12-23 months	Family foods, chopped or mashed if necessary	Depending on the child's appetite, 1-2 snacks may be offered	¾ to one 250ml cup/bowl



### **6-9months baby**

- Continued breastfeeding is recommended
- If not breastfed formula milk is the most acceptable alternative
- At 6 months introduce iron rich foods
- Introduce one new food at a time with an interval of 2-7 days before introducing another to allow the infant acquire the new taste and make it easier to identify the cause of an allergic reaction
- Start small serving sizes
- Provide complementary foods initially 2-3 times a day
- Infants will indicate hunger or satiety. Forced feeding may promote negative associations with eating
- Meal time environment should be free of distractions such as television
- Offer foods with more texture progressing from puree to mashed and then soft finger foods
- Provide vitamin A supplement (as per national guidelines)
- Coffee, tea and hot chocolate should not be given

### **9-12 months**

- Continued breastfeeding is recommended
- Increase frequency of feeding to 3-4 times a day
- Encourage self feeding
- Include baby at table for family mealtimes
- Mealtimes should be free of distractions like TV and activities

### **12-18 months**

- Continued breastfeeding is encouraged
- Whole cow's milk can complement breast milk
- Encourage children to feed themselves at the beginning of the meal when they are hungry but help if they tire later in the meal
- Child should be included at family meal times
- Continue to provide 3-4 meals a day with snacks in between
- By 12 months, babies should be eating a variety of foods from each of the food groups
- De-worm ( as per the national guidelines)
- Development of healthy eating skills is a shared responsibility: parents/caregivers should provide selection of nutritious age appropriate foods and decide when and where food is eaten; babies and children should decide how much they want to.

## Qualities of complementary food

The weaning foods should be:

- Liquid at starting then semisolid and solid foods to be introduced gradually
- Clean, fresh and hygienic so that no infections can occur
- Easy to prepare at home with the available food items and not costly
- Easily digestible, easily acceptable and palatable for the infants
- High in energy density and low in bulk viscosity and contains all nutrients necessary for the baby
- Based on cultural practices and traditional beliefs
- Well-balanced, nourishing and suitable for the infant.

## Principles of introduction of weaning foods

- Breast milk remains the main food for the infant, so the additional foods should provide extra requirements
- A small amount of new foods to be given in the beginning then increased gradually in the course of the week
- New food to be placed over the tongue of the baby to get the taste of the food and to feel the consistency. A single weaning food is added at a time.
- Additional food can be given in the day time
- New foods should be given when the infant is hungry, but never force the child to take the feeds
- Observe the problems related to weaning process e.g. indigestion, pain in abdomen, weaning diarrhea, skin rash & psychological upset.
- Weaning to be started at 6 months but breastfeeding to continue up to 2years

## Complications of late complementary feeding

- Delayed weaning result in malnutrition and growth failure
- Complementary feeding should not be delayed beyond six months of age as this increases the risk of nutrient and energy deficiencies
- Iron deficiency anaemia is more common in infants weaned after six months

## Case study

Alex is a 12 months old baby. His birth weight was 4kg, current he weighs 15kg. His mother complains of him having poor appetite and being a poor feeder. From the 24 hr food recall the mother gives a lot of carbohydrates and less vegetables and fruits.

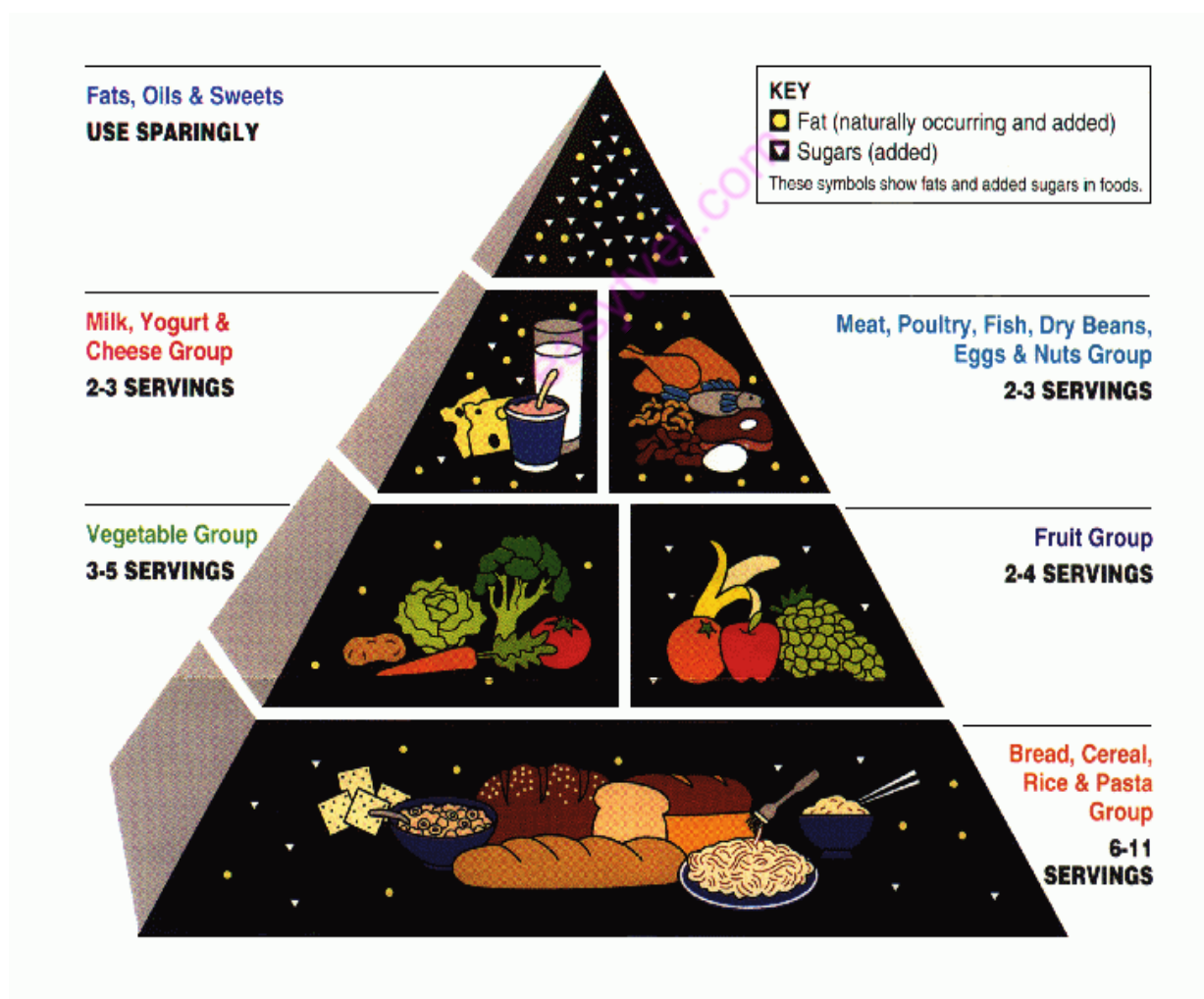
1. Determine his nutritional status ,
2. Give nutritional counselling on right choice of food with the right nutrients
3. Prepare a meal plan for Alex.

### ***13.3.4.3 Self-Assessment***

1. Define commentary feeding
2. An infant is expected to double their birth weight by;
3. 1 month of age
4. 3 months of age
5. 1 year
6. 6 months of age
7. According to WHO, infants aged 6-8 months should receive complementary foods at a frequency of
  - A. 1-2 Times per day
  - B. 3-4 Times per day
  - C. 2-3 Times per day
  - D. 6-8 times per day
8. Honey should never be given to an infant because
  - A. It could be contaminated with clostridium botulinum
  - B. It could be contaminated with clostridium perfringens
  - C. It contains too much sugar and may cause tooth decay
  - D. It may cause the infant reject other foods
9. To help prevent iron deficiency, the diet should include the following:
  - A. Protein rich foods (peas, beans, maize, soy beans and milk)
  - B. Juices such as black currant beverages, ribena and lucozade
  - C. Iron-rich foods (meat, fish, well-cooked eggs, pulses [beans, peas, lentils], nut butters or pastes of finely ground nuts and vegetables)
  - D. Foods such a crisps, candies and sodas
10. Foods rich in vitamin C support the absorption of;
  - A. Iron
  - B. Calcium
  - C. Zinc
  - D. Selenium
11. Explain the importance of continued breastfeeding for up to 2 years
12. Describe the principles of introducing complementary foods to infants
13. Discuss some of the foods which are contraindicated during complementary feeding
14. Discuss the stages of weaning, stating the types of feeds given to the infants in each stage.

### 13.3.4.4 Tools, Materials and resources

1. WHO guidelines
2. MOH guidelines
3. Stationery
4. Skills lab
5. Use of LCDs, video clips, charts and other teaching aids
6. Invitation of competent expertise
7. Workplace procedure manuals
8. Computers with internet
9. Library and resource centre
10. Maternal and child nutrition guidelines
11. Food pyramid guide



#### ***13.3.4.5 References***

*[https://www.who.int/nutrition/topics/complementary\\_feeding/en/](https://www.who.int/nutrition/topics/complementary_feeding/en/)*

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### 13.3.5 Learning Outcome 4: Manage challenges in maternal child nutrition

#### 13.3.5.1 Learning Activities

Learning activity	Specific instructions
i) Address macro and micro nutrients deficiency	<ul style="list-style-type: none"> <li>➤ Observe client privacy</li> <li>➤ Establish a good rapport with the client</li> <li>➤ Counsel pregnant women about healthy eating habits that will prevent any nutrient deficiency</li> </ul>
ii) <b>Monitor Food intake</b>	<ul style="list-style-type: none"> <li>➤ Take clients diet history e.g. 24 hour food recall</li> <li>➤ Apply both prospective and retrospective direct methods of dietary assessment</li> <li>➤ Evaluate the client's dietary intake using the food pyramid</li> <li>➤ Determine the nutrient adequacy during pregnancy</li> </ul>
iii) Improve Quality of nutrition	<ul style="list-style-type: none"> <li>➤ Advice on intake of important nutrients that are lacking in clients diet</li> </ul>
iv) Address Food malnutrition	<ul style="list-style-type: none"> <li>➤ Educate the client on possible disorders that can occur due to over taking or under taking of calories, carbohydrates, protein, vitamins or minerals</li> </ul>
v) Control Infections	<ul style="list-style-type: none"> <li>➤ Encourage primary prevention and counsel on safe sex, family planning, self-care and preparing for the future</li> <li>➤ Advise pregnant mothers not to travel to regions experiencing outbreak of infections</li> <li>➤ Provide mothers with deworming and information on prevention of hookworm infestations.</li> </ul>
vi) Address Nutrition related disorders	<ul style="list-style-type: none"> <li>➤ Educate on common disorders that may result from poor nutrition and how to avoid them</li> </ul>
vii) Address Congenital disorders	<ul style="list-style-type: none"> <li>➤ Advice on intake of nutrients that would cause function anomalies both to mother and child</li> </ul>

#### 13.3.5.2 Information Sheet

##### Definitions

- **Maternal child nutrition** – it refers to the first 1000 days after birth .it also focuses on 2-5 years of age and adolescents.
- **Congenital disorders:** structural or functional anomalies (for example, metabolic disorders) that occur during intrauterine life and can be identified prenatally, at birth, or sometimes may only be detected later in infancy, such as hearing defects.
- **Cretinism:** congenital disease due to absence or deficiency of normal thyroid secretion, characterized by physical deformity, dwarfism, and mental retardation, and often by goiter.

- **Cleft lip:** an opening or a split in the upper lip that occurs when developing facial structures in an unborn baby don't close completely.
- **Cleft palate:** a birth defect in which a baby's palate (roof of the mouth) doesn't form completely and has an opening in it.

### **Importance of promoting maternal child health**

- Ensure the birth of a healthy infant and expectant mother
- To promote the healthy growth and development of children
- Ensure birth of healthy child
- Identify health problems in mother and child
- Prevent malnutrition in mother and children
- Promote family planning services
- To prevent communicable and non-communicable diseases in mother and child
- To educate the mother on improvement of their own and their children health.

### **Challenges facing maternal and child nutrition**

- Maternal malnutrition due to inadequate food intake poor nutritional quality of diet, frequent infections and short inter-pregnancy intervals.
- High rates of HIV infections which compromise maternal nutritional status.
- Sub optimal infant feeding practices, poor quality of complimentary foods, frequent infections and micro nutrient efficiencies.

### **Dietary assessment for pregnant women**

Assess for the following for effective counseling of the mother on her nutrition:

- Eating patterns e.g. food regularly consumed, frequency of meals
- Locally available and affordable foods
- Any existing dietary problems
- Physical activity
- Utilization of micronutrient supplements and alternative practices
- Psychosocial factors which may contribute to inadequacy of intake e.g. stigma, depression etc
- Food aversions and intolerances
- Living environment and functional status (housing, access to food, income, amenities to cook, attitude regarding nutrition and food preparation)
- Food handling practices

The following laboratory tests will also help to assess the nutritional status of a pregnant woman;

- Serum albumin
- Evaluation of anemia (Iron, Vitamin B12, and folate status)
- Urinalysis (for proteinuria)

### **Indicators of good nutritional status during pregnancy**

The following are the signs that a pregnant is well nourished;

- Weight gain within 11.5-16kg
- Hemoglobin level  $\geq 11$ g/dl
- Absence of clinical signs of micronutrient deficiencies

### **Essential Nutrition Actions include:**

- Healthy Maternal Nutrition
- Exclusive Breastfeeding for Infants 0-6 months and continued breastfeeding upto 2 years
- Healthy Complementary Feeding for Children 6-35 months
- Proper Feeding a Sick Child, during and after Illness
- Control of Iodine Deficiency Disorders (IDD)
- Control of Iron Deficiency Anaemia (IDA)
- Control of Vitamin A Deficiency (VAD)

### **Congenital anomalies**

It is estimated that 303000 neonates die within 4 weeks of birth annually, worldwide as a result of congenital anomalies. These problems can contribute to long-term disability, which may have significant impacts on individuals, families, health-care systems, and societies. Heart defects, neural tube defects and Down syndrome are among the most common severe congenital disorders. Some of the contributing factors to congenital disorders include genetic, infectious, nutritional and environmental factors. Preventive measures can be put in place such as adequate intake of folic acid or iodine through fortification of staple foods or supplementation. Some of the congenital disorders include:

- cleft lip and cleft palate
- cerebral palsy
- Down syndrome
- spina bifida
- cystic fibrosis
- heart conditions



## Causes and risk factors of congenital disorders

- i. Genetic factors
- ii. Socioeconomic factors: could lead to a possible lack of access to sufficient, nutritious food by pregnant women, poor access to healthcare and screening.
- iii. Demographic factors: maternal age is a risk factor for abnormal fetal development e.g. mothers who are advanced in age may cause chromosomal abnormalities like down syndrome in the fetus
- iv. Environmental factors: if a pregnant mother is exposed to certain pesticides and chemicals or even exposure to some medications, tobacco, alcohol and radiation, she has a high risk of having a neonate with congenital anomalies.
- v. Infections: syphilis and rubella virus can cause congenital disorders if the mother is infected.
- vi. Maternal nutritional status: an insufficiency of maternal folate can increase her risk of having a baby with neural tube defects (e.g. spina bifida and hydrocephalus) while hypervitaminosis A may affect the normal development of the fetus.

## Ways to prevent congenital anomalies

Important interventions and efforts include:

- Ensuring adolescent girls and mothers have a healthy diet including a wide variety of vegetables and fruit, and maintain a healthy weight;
- Ensuring an adequate dietary intake of vitamins and minerals, and particularly folic acid in adolescent girls and mothers;
- Counseling mothers to avoid harmful substances, especially alcohol and tobacco;
- Pregnant women (and sometimes women of child-bearing age) should avoid travelling to regions experiencing outbreaks of infections known to be associated with congenital anomalies;
- Reducing or eliminating environmental exposure to hazardous substances (such as heavy metals or pesticides) during pregnancy;
- Controlling diabetes prior to and during pregnancy through counselling, weight management, diet and administration of insulin when required;
- Ensuring that any exposure of pregnant women to medications or medical radiation (such as imaging rays) is justified and based on careful health risk–benefit analysis;
- Vaccination, especially against the rubella virus, for children and women;
- Increasing and strengthening education of health staff and others involved in promoting prevention of congenital anomalies;
- Screening for infections, especially rubella, varicella, and syphilis, and consideration of treatment.

## Management of infant nutrition challenges

### *Spina bifida*

Spina bifida is a birth defect that involves the incomplete development of the spinal cord or its covering. The term spina bifida comes from latin and literally means split or open spine. Spina bifida occurs at the first month of pregnancy when the two sides of the embryo spine fail to join together leaving an open area. In some cases the spinal cord or other membranes may push through this opening in back. The condition usually is detected before a baby is born and treated right away



### Causes of spina bifida

- **Folic acid deficiency**
- Maternal diabetes
- Family history
- Obesity
- Increased body temperature from fever or external sources such as hot tubs and electric blankets may increase the chances of delivery of a baby with a spina bifida.
- Medications such as some anticonvulsants.
- Pregnant women taking Valproic acid have an increased risk of having children with spina bifida
- Genetic basis.

### Types of spina bifida

There two forms of spina bifida namely **spina occulta** and **spina manifesta**

#### *Spina difida occulta*

It's the mildest form of spina bifida. Occulta means hidden, meaning that the defects is covered by skin and not open. Most children with this type of condition never have health problems

and the spinal cord is often unaffected. Some can have symptoms if the hidden defect is severe enough

### ***Spina bifida manifesta***

This includes two types of spina bifida;

- i. **Meningocele:** involves the meninges, the membranes responsible for covering and protecting the brain, and spinal cord. If the meninges push through the hole in the vertebrae (the small, ring-like bones that make up the spinal column) the sac is called a meningocele
- ii. **Myelomeningocele:** it's the most severe form of spina bifida
  - It occurs when the meninges push through the hole in the back, and the spinal cord also pushes through
  - Most babies who are born with this type of spina bifida also have **hydrocephalus**, an accumulation of fluid in and around the brain
  - Because of the abnormal development of and damage to the spinal cord, a child with myelomeningocele typically has some paralysis.

### **Signs and symptoms of spina bifida**

Babies who are born with spina bifida occulta often have no outward signs or symptoms. The spinal cord does not protrude through the skin although a patch of hair, a birth mark or a dimple maybe present on the skin over the lower spine. But other forms of the diseases have obvious signs.

Babies who are born with the meningocele form have a fluid filled sac visible on the back.

The sac is often covered by a thin layer of skin and can be as small a grape or as large as a grape fruit. Babies with myelomeningocele also have a sac-like swelling that bulge from the back but a layer of skin may not always cover it in some cases the nerves of the spinal cord maybe exposed

A baby who also has hydrocephalus will have an enlarged head, the result of excess fluid and pressure inside the skull

### **Nutritional therapy for spina bifida**

- Before and during pregnancy a woman can help prevent spina bifida in her child
- Get plenty of folic acid each day eat foods rich in folic acid such as fortified breakfast cereals and breads ,spinach and oranges, the doctor may recommend one to take folic acid supplement
- Avoid alcohol while pregnant
- High fevers should be treated immediately
- The nutritionist may also recommend one to take folic acid supplements it's also advisable for a pregnant women to avoid alcohol

- People with spina bifida have a risk of obesity due to decreased mobility. Obesity is a major health threat and it has been linked to high blood pressure, diabetes, osteoarthritis, abnormal cholesterol metabolism and heart disease
- Foods should be eaten at regular times that are pleasant and that take enough time for individuals to eat slowly and realize when their hunger has been satisfied
- Treats and snacks should be limited to times when a little extra energy is really needed and should be both nutritionally sound and enjoyable
- Physical activity is important to burn calories and can decrease hunger

NB once people with spina bifida have become obese it's even harder for them to lose weight than it's for others. However, an individual is motivated to lose weight and limit calorie intake while increasing exercise. Weight can be reduced using a low calorie diet.

### Cleft lip/palate

They are two distinct facial defects that can occur singly or in combination. They are largely caused by inadequate intake of folic acid before and during pregnancy.

#### Cleft lip

Cleft lip may be unilateral or bilateral. Babies with cleft lip may also experience a cleft in the roof of their mouths (cleft palate)



**Unilateral cleft lip**

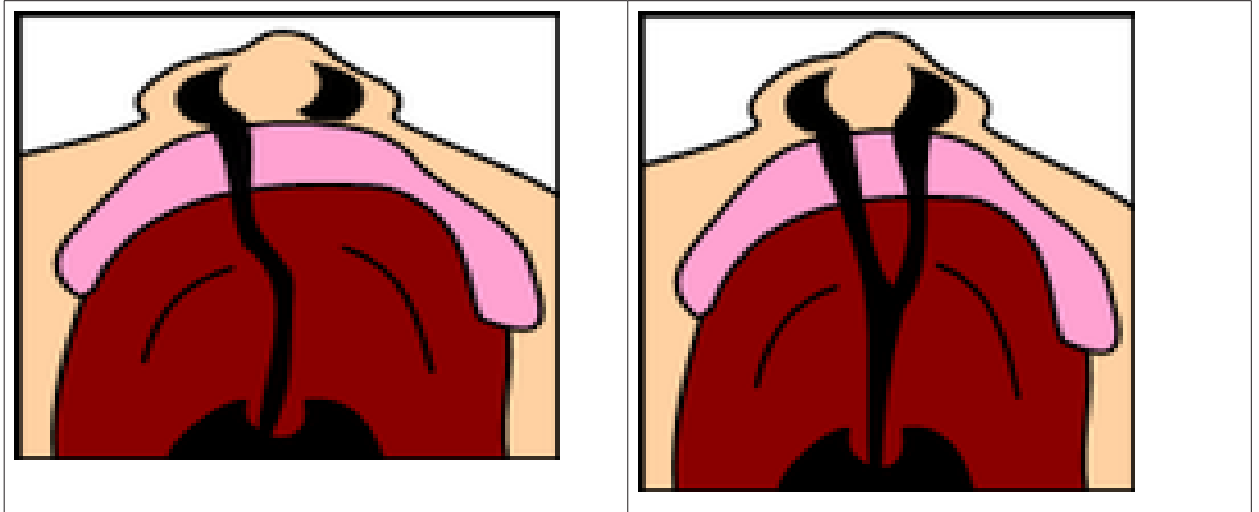


**Bilateral cleft lip**

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#### Cleft palate

It can involve the hard palate (the bony front portion of the roof of the mouth) and/or the soft palate (the soft back portion of the roof).



### Problems caused by cleft

- Feeding problems-foods and liquids can pass through the mouth then back through the nose
- Ear infections and hearing loss
- Speech problems
- Dental problems

### Prevention of cleft

- Preconception check-up
- Before pregnancy, women should take a multivitamin with 400mcg of folic acid in it every day
- During pregnancy, take prenatal vitamins with 600mcg of folic daily
- Don't smoke nor drink alcohol during pregnancy
- Get regular and prenatal care.

Feeding a child with cleft Due to lack of suction, an infant with a cleft may have trouble feeding.

Feeding should be done in a more upright position. Gravity will help prevent milk from coming through the baby's nose in case of palate. Bottle/nipple with a large hole, crosscut or slit in the nipple, protruding nipple and rhythmically squeezing the bottle insert can result controllable flow to the infant without the stigma caused by specialized equipment.

### ***Gravity feeding equipment***

The image below shows a baby being fed using a customized bottle. The upright sitting position allows gravity to help the baby swallow the milk more easily



### **Cretinism**

This condition is also known as congenital hypothyroidism, and it occurs when the diet during pregnancy does not meet the requirements for iodine. It causes impaired neurological function, stunted growth, and physical deformities. The condition may occur because of a problem with the baby's thyroid gland, or a lack of iodine in the mother's body during pregnancy.

A baby's body needs iodine to make thyroid hormones. These hormones are essential for healthy growth, brain, and nervous system development. The child becomes severely stunted with poor physical and mental growth. It is associated with advanced age of the mother and also with late-born children.

### **Signs and symptoms**

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• Floppy infant</li><li>• Thick, increased tongue</li><li>• Poor feeding</li><li>• Constipation</li><li>• Prolonged jaundice</li><li>• Short physique</li><li>• Lack of weight gain</li><li>• Stunted growth</li></ul> | <ul style="list-style-type: none"><li>• Fatigue, lethargy</li><li>• Abnormal bone growth</li><li>• Excessive sleep</li><li>• Mental retardation</li><li>• Hoarse voice</li><li>• Swelling near the navel (umbilical hernia)</li><li>• Pale skin</li><li>• Swelling of the skin and neck</li></ul> |
|--|---|

## **Etiology of cretinism**

- Hypoplasia and mal-descent of thyroid
- Familial enzyme defects
- too little iodine in the mother's diet during pregnancy (endemic cretinism)
- Intake of goitrogens during pregnancy (cassava, cabbage, cruciferous vegetables, soy beans, millets)
- Pituitary defects
- Idiopathic
- radioactive iodine or antithyroid treatment for thyroid cancer during pregnancy
- use of medicines that disrupt thyroid hormone production — such as antithyroid drugs, sulfonamides, or lithium — during pregnancy.

## **Prevention of cretinism**

Consumption of the recommended dietary allowance (RDA) of 150 micrograms of iodine per day. One teaspoon of iodized salt contains about 400 micrograms of iodine.

Because an iodine deficiency in pregnancy can be dangerous to the growing baby, pregnant women are advised to get 220 micrograms of iodine daily. It is recommended that all women who are pregnant or breastfeeding take a prenatal vitamin containing at least 150 micrograms of iodine each day.

## **Phenylketonuria (PKU)**

It is an autosomal recessive inherited disorder of amino acid metabolism that affects the body's utilization of protein. It is marked by the inability to process the amino acid phenylalanine, causing mental retardation & is caused by the absence of the enzyme phenylalanine hydroxylase. Children with PKU have a deficiency of the liver enzyme phenylalanine hydroxylase that normally breaks down the essential amino acid phenylalanine into tyrosine. As a result, phenylalanine accumulates in the blood, causing a musty body and urine odor, irritability, vomiting, hyperactivity, seizures and eczema like rash.

## **Dietary management in phenylketonuria**

- Diet low in phenylalanine to keep plasma phenylalanine levels between 2 and 6 mg/dl
- The diet must meet the child's need for optimal growth
- High-protein foods (meats and dairy products) are avoided and aspartame are avoided because they contain large amounts of phenylalanine.
- Elemental foods (with phenylalanine removed) can be used.
- The low-phenylalanine diet should be maintained for life
- The low phenylalanine diet is especially good for adolescent females and women prior to conception and during pregnancy to prevent congenital anomalies (low birth weight, mental retardation, microcephaly) in the fetus.

## Management of maternal nutrition challenges

Maternal challenges during pregnancy are mostly related to metabolism.

### a) Nausea and vomiting

Nausea refers to a feeling of a need to vomit which occurs during the first trimester of pregnancy, commonly known as morning sickness. It occurs in the morning, soon after getting out of bed, especially among primigravidas. This ends when the pregnancy proceeds to the second trimester. The suggestions to relieve nausea include;

- i) Eat dry crackers or dry toast before rising
- ii) Eat small, frequent meals
- iii) Avoid foods with offensive odours.
- iv) Avoid liquids at mealtime. Drink water or other liquids between meals to avoid dehydration and acidosis.
- v) Reduce fat intake

In rare cases, the nausea persists and becomes so severe that it is life-threatening. This condition is called hyperemesis gravidarum. The mother may be hospitalized and given parenteral nutrition. This means the patient is given nutrients via a vein. This is discussed more fully in Chapter 16. Such cases are difficult, and the patients need emotional support and optimism from those who care for them.

### b) Constipation

This is a common ailment caused by atonicity of the gut due to the effect of progesterone, diminished physical activity and pressure of the gravid uterus on the pelvic colon. This results in sluggish bowel function.

Constipation and haemorrhoids can be relieved by eating high-fibre foods, getting daily exercise, drinking at least 8 glasses of liquid each day, and responding immediately to the urge to defecate. The suggestions to prevent/relieve constipation include;

- Eat foods high in fiber (fruits, vegetables and wholegrains)
- Exercise regularly
- Drink at least 8 glasses of liquids a day
- Respond promptly to the urge to defecate
- Use laxatives only as prescribed by a physician; mineral oil should be avoided as it interferes with absorption of fat-soluble vitamins.

### c) Acidity and Heartburn

Heartburn can result from relaxation of the esophageal sphincter and hiatus hernia, related to progesterone. Heartburn is a common complaint during pregnancy. Heartburn results from gastroesophageal reflux disease (GERD) in almost 10% of all gravidas. As the fetus grows, it pushes on the mother's stomach, which may cause stomach acid to move into the lower esophagus and create a burning sensation there. Heartburn may be relieved by;



- Eating small, frequent meals
- Chewing food thoroughly
- Relaxing and eating slowly
- avoiding spicy or greasy foods
- avoiding liquids with meals
- sitting up while eating (elevate the head while sleeping)
- waiting at least an hour after eating before lying down
- waiting at least 2 hours before exercising

#### **d) Excessive salivation (ptyalism)**

Increased secretion of saliva is observed during pregnancy. It may be associated with increased intake of starch, though actual cause is unknown.

#### **Management**

This problem is usually self-limiting and may be overcome by decreasing intake of carbohydrates

It is not associated with any adverse pregnancy outcome

#### **e) Cravings (Pica) and aversions**

This may be for food or non-food substances. Pica is characterized by an appetite for substances that are largely non-nutritive, such as paper, clay, metal, chalk, soil, glass, or sand.

Encourage the pregnant mother to eat small but frequent meals, offer psychosocial counseling and discourage consumption of non-food substances. These substances may lead to infections further compromising the pregnant woman's nutrition status.

#### **f) Gastrointestinal discomfort**

This is also a common complaint during pregnancy. In order to manage this condition counsel expectant mothers experiencing the condition to;

- Take small frequent meals
- Avoid hunger
- Take low fat-protein foods and simple carbohydrate foods
- Drink fluids between meals rather than with meals to avoid delayed digestion
- Avoid consumption of fried foods and spices or other foods that can lead discomfort especially gas forming foods such as beans, peas, etc
- Drink small amount of fresh fruit juice every 1 to 2 hours
- Avoid consumption of alcohol and caffeine containing beverages

### **g) Oedema**

This is accumulation of fluids in the body. For expectant women having edema:

- Sodium restriction or diuretics are not necessary
- Where edema occurs on the legs, ensure that the mother sits with her legs placed on a raised surface

### **h) Excessive weight gain**

When a pregnant woman has excessive weight gain, she should be advised to re-evaluate her diet and eliminate foods such as sweets, cookies, biscuits, chips, rich desserts, salad dressings and sweetened beverages. A bowl of clean, crisp, raw vegetables such as broccoli or cauliflower tips, carrots, celery, cucumber, zucchini sticks, or radishes dipped in a fat-free salad dressing or salsa can provide interesting snacks that are nutritious, filling, satisfying, and low in calories. Fruits and custards made with fat-free milk make nutritious, satisfying desserts that are not high in calories. Broiling, baking, or boiling foods instead of frying can further reduce the caloric intake.

### **Obesity in pregnancy**

*Counsel the mother on;*

- Controlling kilocalorie intake by restricting fats, sugar and empty calorie intake
- Encourage regular exercise
- Discourage weight reduction regimes

### **i) Pregnancy induced hypertension (PIH)**

This is also known as toxæmia or preeclampsia and it mostly occurs during third trimester. It is characterized by high blood pressure, the presence of albumin in the urine (proteinuria), and oedema. The oedema causes a somewhat sudden increase in weight. If the condition persists and reaches the eclamptic (convulsive) stage, convulsions, coma, and death of mother and child may occur. Pregnant adolescents have a higher rate of PIH than do pregnant adults.

### **j) Pica**

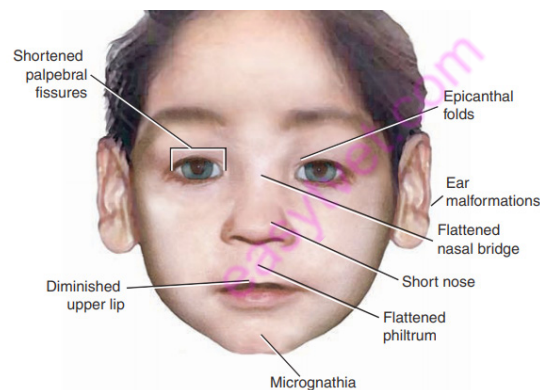
Although both men and women are affected, pica is most common among pregnant women. Some believe it relieves nausea. Others think the practice is based on cultural heritage. The consumption of soil should be highly discouraged. Soil contains bacteria that would contaminate both mother and foetus. Ingesting soil can lead to an intestinal blockage, and substances in the soil would bind with minerals, preventing absorption by the body and thus leading to nutrient deficiencies. If any of the non-food substances replaces nutrient rich foods in the diet, this will result in multiple nutrient deficiencies. Eating laundry starch, in addition to a regular diet, will add unneeded calories and carbohydrates.

### k) Anaemia

The patient suffering from anaemia does not receive sufficient oxygen from the blood and consequently feels weak and tired, has a poor appetite, and appears pale. Iron deficiency is its most common form. During pregnancy, the increased volume of blood creates the need for additional iron. When this need is not met by the diet or by the iron stores in the mother's body, iron deficiency anaemia develops. This may be treated with a daily iron supplement. Folate deficiency can result in a form of megaloblastic anaemia that can occur during pregnancy. It is characterized by too few red blood cells and by large immature red blood cells. The body's requirement for folic acid increases dramatically when new red blood cells are being formed. Consequently, the obstetrician might prescribe a folate supplement of 400 to 600 µg a day during pregnancy.

### l) Alcohol, caffeine, drugs and tobacco

Many infants with FAS are premature and have a low birth weight. Physical characteristics may include a small head, short eye slits that make eyes appear to be set far apart, a flat midface, and a thin upper lip. There is usually a growth deficiency (height, weight), placing the child in the lowest tenth of age norms. There is also evidence of central nervous system dysfunction, including hyperactivity, seizures, attention deficits, and microcephaly (small head).



Caffeine is known to cross the placenta, and it enters the fetal bloodstream. Birth defects in newborn rats whose mothers were fed very high doses of caffeine during pregnancy have been observed, but there are no data on humans showing that moderate amounts of caffeine are harmful. As a safety measure, however, it is suggested that pregnant women limit their caffeine intake to 2 cups of caffeine-containing beverages each day, or less than 300 mg/day. Drugs vary in their effects, but self-prescribed drugs, including vitamins and mineral supplements and dangerous illegal drugs, can all damage the fetus. Drugs derived from vitamin A can cause fetal malformations and spontaneous abortion. Illegal drugs can cause the infant to be born addicted to whatever substance the mother used and, possibly, to be born with the human immunodeficiency virus (HIV). If a pregnant woman is known to be infected with HIV, her physician may prescribe AZT in an attempt to prevent the spread of the disease to the developing foetus. Tobacco smoking by pregnant women has for some time been associated with babies of reduced birth weight. The more the mother smokes, the smaller her baby will be because smoking reduces the oxygen and nutrients carried by the blood. Other risks associated with smoking include SIDS (sudden infant death syndrome), foetal

death, spontaneous abortion, and complications at birth. Smoking during pregnancy may also affect the intellectual and behavioural development of the baby as it grows up.

### **Dietary requirements for diabetic pregnant women**

Diabetes mellitus is a group of diseases in which one cannot use or store glucose normally because of inadequate production or use of insulin. This impaired metabolism causes glucose to accumulate in the blood, where it causes numerous problems if not controlled. (See Chapter 16 for additional information on diabetes mellitus.) Some women have diabetes when they become pregnant. Others may develop gestational diabetes during pregnancy. In most cases, this latter type disappears after the infant is born; however, there is a 40% increased risk of developing type 2 diabetes later in life. Either type increases the risks of physical or mental defects in the infant, stillbirth, and macrosomia unless blood glucose levels are carefully monitored and maintained within normal limits. Every pregnant woman should be tested for diabetes between 16 and 28 weeks of gestation. Those found to have the disease must learn to monitor their diets to maintain normal blood glucose levels and to avoid both hypoglycaemia and hyperglycaemia. In general, the nutrient requirements of the pregnant woman with diabetes are the same as for the normal pregnant woman. The diet should be planned with a registered dietician or a certified diabetes educator because it will depend on the type of insulin and the time and number of injections. Clients with gestational diabetes and diabetic clients who do not normally require insulin to control their diabetes may require insulin during pregnancy to control blood glucose levels. Oral hypoglycemic agents have also been approved for use during pregnancy. Between-meal feedings help maintain blood glucose at a steady level. Artificial sweeteners have been researched extensively and found to be safe for use during pregnancy.

#### **13.3.5.3 Self-assessment**

1. Define maternal child nutrition
2. \_\_\_\_\_ congenital disease due to absence or deficiency of normal thyroid secretion, characterized by physical deformity, dwarfism, and mental retardation, and often by goiter
  - A. Cleft lip
  - B. Down syndrome
  - C. Cleft palate
  - D. Cretinism
3. Spina bifida is a birth defect that involves the incomplete development of the \_\_\_\_\_
  - A. Brain
  - B. Spinal cord
  - C. Head
  - D. Bones and joints

4. The most appropriate way to feed babies born with cleft can be successfully is;
  - a. Breastfeeding
  - b. Bottle feeding
  - c. Cup and spoon feeding
  - d. Gravity feeding equipment
5. Too little intake of \_\_\_\_\_ in the mother's diet during pregnancy can cause cretinism
  - a. Iodine
  - b. Folic acid
  - c. Calcium
  - d. Vitamin D
6. The expectant woman having oedema can be managed by;
  - a. Sodium restriction
  - b. Potassium restriction
  - c. Regular exercises
  - d. Elevating the legs on a raised surface
7. Differentiate between cleft lip and cleft palate.
8. Explain the two types of spina bifida.
9. Outline the laboratory tests that will be helpful during the assessment of nutritional status of pregnant women.
10. State the essential nutrition actions during pregnancy.
11. Describe the dietary requirement of diabetic pregnant woman.
12. Discuss the management of the following congenital disorders:
  - A. Phenylketonuria
  - B. Cretinism

#### ***13.3.5.4 Tools, Materials and equipment***

1. WHO guidelines
2. MOH guidelines
3. Stationery
4. Skills lab
5. Use of LCDs, video clips, charts and other teaching aids
6. Invitation of competent expertise

7. Workplace procedure manuals
8. Computers with internet
9. Library and resource centre

#### **13.3.5.5 References**

*<https://motherchildnutrition.org/nutrition-protection-promotion/essential-nutrition-actions/index.html>*

*WHO: <https://www.who.int/news-room/fact-sheets/detail/congenital-anomalies>. Retrieved on 30<sup>th</sup> September 2019.*

*<https://www.fhi360.org/expertise/maternal-and-child-nutrition>*

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Ruth O., (2011) Nutrition and Diet Therapy. 10th edition

*easytvvet.com*

### 13.3.6 Learning Outcome 5: Provide nutrient supplementation in pregnancy and childhood

#### 13.3.6.1 Learning Activities

Learning activity	Specific instructions
i) Administer macro and micro nutrients <ul style="list-style-type: none"><li>Review WHO guidelines</li></ul>	<ul style="list-style-type: none"><li>Administer balanced energy and protein dietary supplementation in undernourished populations.</li><li>Give iron and folic acid supplements to pregnant women</li><li>Give calcium supplements to pregnant women on need basis</li><li>Give vitamin A supplements to infants and children</li></ul>
ii) Follow IMAM guidelines	<ul style="list-style-type: none"><li>Provide supplementation for children with acute malnutrition</li></ul>
iii) Administer therapeutic feeding Review WHO standards	<ul style="list-style-type: none"><li>Prescribe therapeutic feeds based on the nutrition status</li><li>Monitor weight changes during management</li></ul>

#### 13.3.6.2 Information Sheet

##### Definitions

- Malnutrition** – It is lack of proper nutrition, caused by not having enough to eat, not eating enough of the right things, or being unable to use the food that one does eat. It may involve calories, protein, carbohydrates, proteins or minerals
- Micronutrient supplements:** a category of dietary supplements that contain single or multiple vitamins and minerals.
- Dietary supplement:** a product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin; a mineral; an herb or other botanical; an amino acid; a dietary substance for use by man to supplement the diet by increasing the total daily intake; or a concentrate, metabolite, constituent, extract, or combination of these ingredients
- F75** : Special milk for stabilization of severe malnutrition
- F100** : Special milk for catch up growth for severe malnutrition

### A. Supplementation in pregnancy

Globally, approximately two billion people, the majority young women and young children, are affected by micronutrient deficiencies, with even high rates during pregnancy.

#### Risk factors for micronutrient deficiency in pregnancy

- Poor quality diets
- High fertility rates
- Repeated pregnancies
- Short inter-pregnancy intervals
- Increased physiological needs

Indicators for malnutrition in pregnant women include:

- Weight gain of  $\leq 11.5$ kg
- Weight gain  $\leq 1$ kg per month in the last trimester of the pregnancy
- Mid Upper Arm Circumference (MUAC)  $< 23$ cm
- Hemoglobin level below 11 g/dl
- Presence of goitre
- Presence of clinical signs of micronutrient deficiencies

A healthy diet contains adequate energy, protein, vitamins and minerals, obtained through the consumption of a variety of foods, including green and orange vegetables, meat, fish, beans, nuts, whole grains and fruit. In undernourished populations, balanced energy and protein. Dietary supplementation is recommended for pregnant women to reduce the risk of stillbirths and small-for-gestational-age neonates.

#### Iron and folic acid supplementation

Folic acid requirements increase in pregnancy because of the rapidly dividing cells in the fetus and elevated urinary losses. World Health Organization (WHO) recommends iron and folic acid supplementation in pregnant women at a dose of 30–60 mg of elemental iron plus 0.4 mg of folic acid daily.

Daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400  $\mu$ g (0.4 mg) of folic acid is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight, and preterm birth. The equivalent of 60 mg of elemental iron is 300 mg of ferrous sulfate heptahydrate, 180 mg of ferrous fumarate or 500 mg of ferrous gluconate. Folic acid should be commenced as early as possible (ideally before conception) to prevent neural tube defects.

Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron (The equivalent of 120 mg of elemental iron equals 600 mg of ferrous sulfate heptahydrate, 360 mg of ferrous fumarate or 1000 mg of ferrous gluconate) and 2800  $\mu$ g (2.8 mg) of folic acid once



weekly is recommended for pregnant women to improve maternal and neonatal outcomes if daily iron is not acceptable due to side-effects, and in populations with an anaemia prevalence among pregnant women of less than 20%.

### Calcium supplementation

In populations with low dietary calcium intake, daily calcium supplementation (1.5–2.0 g oral elemental calcium) is recommended for pregnant women to reduce the risk of pre-eclampsia

### Vitamin A supplementation

Vitamin A supplementation is only recommended for pregnant women in areas where vitamin A deficiency is a severe public health problem, to prevent night blindness.

Vitamin A deficiency is a severe public health problem if > 5% of women in a population have a history of night blindness in their most recent pregnancy in the previous 3–5 years that ended in a live birth, or if > 20% of pregnant women have a serum retinol level

### *Micronutrient supplementation for pregnant and lactating mothers*

Micronutrient	Target group	Dosage	Frequency	Timing and schedule
Vitamin A	Pregnant	-	-	-
	Lactating	200,000IU	Single dose	At delivery (should be given within 4 weeks of delivery)
Folic acid	Pregnant	400 µg/0.4mg	Daily throughout pregnancy	From first month of pregnancy or on 1 <sup>st</sup> contact
	Lactating	280 µg		
Iron	Pregnant	60mg	Daily throughout pregnancy (critical for the first 90 days of pregnancy)	From first month of pregnancy or on 1 <sup>st</sup> contact
	Adolescent and adults including pregnant women with anaemia	120mg	Daily	3 months

Source: *The Kenya National Technical Guidelines for Micronutrient Deficiency Control (2008)*

### B. Supplementation for infants and children

Vitamin A supplements should be administered to infants from 6months and after every 6 months

Age	Dosage
<6 months	50,000 IU
6-12 Months	100,000 IU
>12 Months	200,000 IU

## Supplementation for severely malnourished children

### • Vitamin A Supplementation

F75, F100, RUTF and locally-developed milk with CMV provide the adequate amount of Vitamin A to manage mild Vitamin A deficiency and to replace low liver stores of Vitamin A during treatment.<sup>3</sup> However, many malnourished patients have a serious Vitamin A deficiency, therefore:

- Administer a dose of Vitamin A to all new admissions except:
  - Patients who have received Vitamin A within the last month, or
  - For children admitted with oedema:
    - administer a single dose of Vitamin A at discharge from in-patient facility after completion of Phase 2, or
    - Administer a single dose of Vitamin A on week four of OTP management, when the patient is transferred from in patient to outpatient care.
- If patient has signs of severe vitamin A deficiency (clinical signs such as night blindness, conjunctival xerosis with Bibot's spots, corneal xerosis or ulceration or keratomalacia), give a dose of vitamin A according to Table 1, for two consecutive days, followed by an additional dose two weeks later.
- Administer a dose of Vitamin A to all in-patients on the day of discharge<sup>4</sup> (i.e. completion of Phase 2). For patients managed at OTP, including those transferred from in-patients, administer a dose of vitamin A at week four after admission.

### *Vitamin A systemic treatment*

Age	Vitamin A/IU orally on Day 1
6 to 12 months	1 blue capsule 100,000IU=30,000ug
12 months and older	2 blue capsules 200,000IU=60,000ug

### **Folic Acid**

There is sufficient folic acid in F75, F100 and RUTF to treat mild folate deficiency. If a patient shows clinical signs of anaemia give 5mgs of folic acid. Moderate Anaemia is identified by palmer paler (very pale palms of the hands), and/or check conjunctiva colour. A very pale conjunctiva is a sign of moderate or severe anaemia.

### • Iron Supplementation

High-dose iron tablets are contraindicated as they can increase the risk of severe infection in severe acute malnourished patients due to the presence of free iron in the blood.

**If moderate anaemia is identified:** For in-patients receiving entire treatment of acute malnutrition in the in-patient health facility: Add iron to the F100 in Phase 2.

## Supplemental Suckling Technique

The supplementation is given using a tube the same size as n°8 NGT (a size n°5 tube can be used, but the milk should be strained through cotton wool to remove any small particles that would block the tube). Cut the tip of the NG tube back beyond side ports on the tube, if these ports exist

1. F100 Diluted or formula milk is put in a cup. The mother holds it.
2. The end of the tube is put in the cup.
3. The tip of the tube is put on the breast at the nipple and the infant is offered the breast in the normal way so that the infant attaches properly. Sometimes at the beginning the mothers find it better to attach the tube to the breast with a piece of tape.
4. When the infant suckles on the breast with the tube in his mouth, the milk from the cup is sucked up through the tube and taken by the infant. It is like taking a drink through a straw.
5. At first an assistant needs to help the mother by holding the cup and the tube in place. She encourages the mother confidently. Later the mother nearly always manages to hold the cup and tube without assistance.
6. At first, the cup should be placed at about 5 to 10cm below the level of the nipple so the milk does not flow too quickly and distress the infant, and so the weak infant does not have to suckle excessively to take the milk. As the infant becomes stronger the cup should be lowered progressively to about 30cm below the breast.
7. The mother holds the tube at the breast with one hand and uses the other for holding the cup.



This infant is suckling the breast and also getting the F100 Diluted (130ml/kg/day) by the Supplemental Suckling (SS) technique.

Raising or lowering the cup determines the ease with which the infant gets the supplement: for very weak infants it can be at the level of the infant's mouth. If it is above this level the feed can go into the child by siphonage when there is a danger of aspiration

*Supplemental Suckling Technique*

### Notes:

- It may take one or two days for the infant to get used of the tube and the taste of the mixture of milks, but it is important to persevere.
- By far the best person to show the mother the technique is another mother who is using the technique successfully. Once one mother is using the SS technique successfully the other mothers find it quite easy to copy her.

- The mother should be relaxed. Excessive or officious instructions about the correct positioning or attachment positions often inhibit the mother and make her think the technique is much more difficult than it is. Any way in which the mother is comfortable and finds that the technique works is satisfactory.
- If the formula diet is changed then the infant normally takes a few days to become used to the new taste. It is preferable to continue with the same supplementary diet throughout the treatment.

## Nutrition supplements

It is important to have set standards for commercial nutritional supplements for health facilities, to ensure that the supplements procured provide considerable contribution to the nutritional status of the patients/clients. The table below provides a summary of the basic requirements of commercial supplements.

### *Basic Requirements for Commercial Nutritional Supplements for Hospitals*

Type of Nutritional Supplement.	Basic requirements.
Nutritionally complete liquid diets.	Approximately 1 Kcal per ml; 3.8-4.4gm protein per 100 ml; Shelf life of >1yr.  Feed with fiber for diabetic pts.  High energy protein drink with hydrolyzed protein for pts with GIT disturbances to provide 1.2kcal/ml and 3.5-4.0 gm protein per 100ml  The drink should also be milk protein free, fat and lactose free and gluten free. In assorted flavors.
Preterm and low birth weight infant formula.	13-15gm protein per 100g powder; 54-56 gm CHO per 100g powder; 23-25gm fat per 100g powder; Shelf life of >1yr.
Infant formula for infants of normal weight (above 2,500gm) aged below 6 months.	11-12gm protein per 100g powder; 56-58gm CHO per 100g powder; 25-28gm fat per 100g powder;  Whey predominant with lactose as carbohydrate source; Shelf life of >1yr.
Pediatric nutritionally complete diet for children 1-10 years.	3.0-4.0 gm protein per 100 ml; 10-20gm CHO per 100ml; 5-7gm fat per 100ml; Enriched with vitamins and minerals; Shelf life of >1yr.
Follow-up infant formula for children above six months with probiotics and iron.	2.2-2.7gm protein per 100 ml; Casein predominant; shelf life of >1yr.
Nutritionally complete balanced diet for Enteral and oral use.	Low osmolarity and isocaloric feed, enriched with insoluble and soluble fiber; 35-40gm protein per liter; 120-190gm CHO per liter; 25-40gm fat per liter; Enriched with micronutrients. Shelf life of >1yr.

Nutritionally complete balanced diet for Enteral tube or oral feeding of patients with hyperglycemia.	<ul style="list-style-type: none"> <li>• Isocaloric diet enriched with fiber</li> <li>• 0.9-1kcal/ml</li> <li>• 35-40gm protein per liter</li> <li>• 80-115gm CHO per liter</li> <li>• 40-45gm fat per liter</li> <li>• Shelf life of &gt;1yr</li> </ul>
High protein and energy sip feed for catabolic patients.	<ul style="list-style-type: none"> <li>• 8-10gm protein per 100 ml</li> <li>• 1.5-1.7kcal/ml</li> <li>• Shelf life of &gt;1yr</li> </ul>
Breast milk fortifier for premature or low birth weight infants.	<ul style="list-style-type: none"> <li>• To provide 350-400 kcal</li> <li>• 20-25gm protein per 100gm powder</li> <li>• 65-70gm CHO per 100gm powder</li> <li>• Shelf life of &gt;1yr</li> </ul>

### Care of the mother

The mother who is admitted in the centre with her child receives Vitamin A:

- A. If the child is below 1 month old 200.000IU (there should be no risk of pregnancy)

Micronutrients' supplementation must also be given to the mother. The quality of the milk depends upon the mother's nutritional status. It is critical that the mother receives meals while the child is an in-patient. The mother's diet is important for the recovery of the infant from malnutrition.

### Therapeutic feeds

There are two main therapeutic feeds used in management of malnourished clients

- F75
- F100
- Ready to use therapeutic foods (RUTF)

#### 1. F75

The formula is used during phase 1 treatment of patients who are initially admitted to an in-patient facility without an adequate appetite and/or a major medical complication. It provides 75kcal for every 100ml of milk and is used during stabilization phase.

This formula (F75) promotes recovery of normal metabolic function and nutrition-electrolytic balance. In Phase 1, the patient receives F75 formula at 100kcal/ kg/day. Rapid weight gain at this stage is dangerous, that is why the quantities and formula are formulated so that patients do not gain weight during this stage. The patient remains in Phase 1 until the

medical complications stabilize and until the appetite improves and the patient completes the designated quantity of F75 or equivalent diet at each mealtime.

The milk diet is given at regular intervals throughout the day (approximately every two to three hours). The quantity required for each 24 hour period is determined by the child's weight. To determine the amount per feed, divide the 24-hour required quantity by the number of feeds per day.

In Phase 1 the number of daily feeds is determined by the following:

- In 24-hour care with sufficient trained staff to prepare and distribute the feeds overnight give: eight (8) feeds per day.
- If night feeds are problematic (e.g. limited night staff available for feeds, lack of kitchen equipment) give: five to six (5-6) feeds per day. For example, every three hours from 6am to 9pm.<sup>1</sup>
- For daycare situations: five to six (5-6) feeds during the day

For severely malnourished patients with severe oedema (+++), reduce the quantity of F75 by up to 20% until the oedema begins to subside.

***Quantity of F75 or prepared milk to give during Phase 1, per kg of body weight***

<b>Class of Weight (kg)</b>	<b>8 feeds per day (ml for each feed)</b>	<b>6 feeds per day (ml for each feed)</b>	<b>5 feeds per day (ml for each feed)</b>
<b>2.0 to 2.1 kg</b>	<b>40 ml per feed</b>	<b>50 ml per feed</b>	<b>65 ml per feed</b>
2.2 - 2.4	45	60	70
<b>2.5 - 2.7</b>	<b>50</b>	<b>65</b>	<b>75</b>
2.8 - 2.9	55	70	80
<b>3.0 - 3.4</b>	<b>60</b>	<b>75</b>	<b>85</b>
3.5 - 3.9	65	80	95
<b>4.0 - 4.4</b>	<b>70</b>	<b>85</b>	<b>110</b>
4.5 - 4.9	80	95	120
<b>5.0 - 5.4</b>	<b>90</b>	<b>110</b>	<b>130</b>
5.5 - 5.9	100	120	150
<b>6 - 6.9</b>	<b>110</b>	<b>140</b>	<b>175</b>
7 - 7.9	125	160	200
<b>8 - 8.9</b>	<b>140</b>	<b>180</b>	<b>225</b>
9 - 9.9	155	190	250
<b>10 - 10.9</b>	<b>170</b>	<b>200</b>	<b>275</b>
11 - 11.9	190	230	275
<b>12 - 12.9</b>	<b>205</b>	<b>250</b>	<b>300</b>
13 - 13.9	230	275	350
<b>14 - 14.9</b>	<b>250</b>	<b>290</b>	<b>375</b>
<b>15 - 19.9</b>	<b>260</b>	<b>300</b>	<b>400</b>
20 - 24.9	290	320	450
<b>25 - 29.9</b>	<b>300</b>	<b>350</b>	<b>450</b>
30 - 39.9	320	370	500
<b>40 - 60</b>	<b>350</b>	<b>400</b>	<b>500</b>



Breastfed children are always offered breast milk before the diet, and always on demand.

- **Preparation of F75**

If F75 is available, add one packet (410g) of F75 to two (2) litres of water. (Water must be boiled and cooled prior to mixing.) If five or less children are being treated for severe acute malnutrition, less quantities of F75 milk are necessary. Smaller volumes can be mixed using the red scoop (4.1g) included with the F75 package (20 ml water per red scoop/4.1g of F75). Prepare enough milk for the next three hours, not longer, to assure that it will not spoil. If there is access to a refrigerator, milk can be stored for a maximum of 12 hours. When F75 is not available, refer to IMAM guidelines for alternative recipes.

***Quantity of F75 or prepared milk to give during Phase 1, per kg of body weight***

<b>Class of Weight (kg)</b>	<b>8 feeds per day (ml for each feed)</b>	<b>6 feeds per day (ml for each feed)</b>	<b>5 feeds per day (ml for each feed)</b>
<b>2.0 to 2.1 kg</b>	<b>40 ml per feed</b>	<b>50 ml per feed</b>	<b>65 ml per feed</b>
2.2 - 2.4	45	60	70
<b>2.5 - 2.7</b>	<b>50</b>	<b>65</b>	<b>75</b>
2.8 - 2.9	55	70	80
<b>3.0 - 3.4</b>	<b>60</b>	<b>75</b>	<b>85</b>
3.5 - 3.9	65	80	95
<b>4.0 - 4.4</b>	<b>70</b>	<b>85</b>	<b>110</b>
4.5 - 4.9	80	95	120
<b>5.0 - 5.4</b>	<b>90</b>	<b>110</b>	<b>130</b>
5.5 - 5.9	100	120	150
<b>6 - 6.9</b>	<b>110</b>	<b>140</b>	<b>175</b>
7 - 7.9	125	160	200
<b>8 - 8.9</b>	<b>140</b>	<b>180</b>	<b>225</b>
9 - 9.9	155	190	250
<b>10 - 10.9</b>	<b>170</b>	<b>200</b>	<b>275</b>
11 - 11.9	190	230	275
<b>12 - 12.9</b>	<b>205</b>	<b>250</b>	<b>300</b>
13 - 13.9	230	275	350
<b>14 - 14.9</b>	<b>250</b>	<b>290</b>	<b>375</b>
<b>15 - 19.9</b>	<b>260</b>	<b>300</b>	<b>400</b>
20 - 24.9	290	320	450
<b>25 - 29.9</b>	<b>300</b>	<b>350</b>	<b>450</b>
30 - 39.9	320	370	500
<b>40 - 60</b>	<b>350</b>	<b>400</b>	<b>500</b>

## 2. F100

This formula replaces F75 as the patient's diet is increased from 100kcal/kg/day to 130kcal/kg/day for children. It provides the client with 100kcal for every 100ml of milk and is used during the transition phase of management of SAM. The quantity of milk remains the same as with F75, but the calorie content changes by changing milk formulas from 75kcal to 100kcal

per 100ml of milk. The patient in Transition Phase receives around 30% more calories than when in Phase 1. Daily weight gain can be expected at about 6gm/kg/day. For example, a child who weighs 4kg should gain about 24g a day.

The formula should be administered for two to three days when patients have a good appetite; are tolerating the diet given; have no major medical complications; and oedema is resolved. The patient then moves to phase 2.

- **Preparation of F100**

Prepare F100 by adding a sachet of F100 milk powder to two (2) litres of boiled cooled water. If small quantities of milk are required (few children in need of nutritional rehabilitation), add one (1) red scoop (4.1g) powder milk to 18ml boiled and cooled water. For small quantities of locally made-up milk see recipes in IMAM guidelines

**Quantity of F100 to give during Transition Phase, per kg of body weight**

Class of Weight (kg)	8 feeds per day	6 feeds per day	5 feeds per day
<b>F100 full strength should not be given. Only F100 Diluted is given.</b>			
<b>Less than 3kg</b>			
<b>3.0 to 3.4 kg</b>	<b>60 ml per feed</b>	<b>75 ml per feed</b>	<b>85 ml per feed</b>
3.5 – 3.9	65	80	95
<b>4.0 – 4.4</b>	<b>70</b>	<b>85</b>	<b>110</b>
4.5 – 4.9	80	95	120
<b>5.0 – 5.4</b>	<b>90</b>	<b>110</b>	<b>130</b>
5.5 – 5.9	100	120	150
<b>6 – 6.9</b>	<b>110</b>	<b>140</b>	<b>175</b>
7 – 7.9	125	160	200
<b>8 – 8.9</b>	<b>140</b>	<b>180</b>	<b>225</b>
9 – 9.9	155	190	250
<b>10 – 10.9</b>	<b>170</b>	<b>200</b>	<b>275</b>
11 – 11.9	190	230	275
<b>12 – 12.9</b>	<b>205</b>	<b>250</b>	<b>300</b>
13 – 13.9	230	275	350
<b>14 – 14.9</b>	<b>250</b>	<b>290</b>	<b>375</b>
15 – 19.9	260	300	400
<b>20 – 24.9</b>	<b>290</b>	<b>320</b>	<b>450</b>
25 – 29.9	300	350	450
<b>30 – 39.9</b>	<b>320</b>	<b>370</b>	<b>500</b>
40 – 60	350	400	500

**Warning:** F100 is never given out for use at home. It is always prepared and distributed in an in-patient unit. F100 is not kept in liquid form at room temperature for more than three hours before it is consumed.



### 3. Ready to use therapeutic food (RUTF)

This formula is administered in Phase 2 during treatment of SAM when the patient is expected to receive F100 at 200kcal/kg/day or the equivalent in the form of RUTF. Those formulas are designed for patients to rapidly gain weight (more than 8g/kg/ day). Recovered patients are discharged for supplementary feeding if available at the nearest health facility.

Initially RUTF and F100 meals can alternate with RUTF given every other feed (20g of RUTF is equivalent to 100ml of F100). If the RUTF is tolerated, the patient's diet changes to RUTF for the remainder of Transition Phase. Patients may initially refuse RUTF. If this is the case, give the patient the F100 diet and offer RUTF again the next day. Discharge to out-patient treatment of acute malnutrition is only advised when the patient tolerates at least 75% of the amount of RUTF calculated for the individual child

- **Administration of RUTF**

Children who are not taking 75% RUTF are given F100 to make up any deficit in intake. No other food is given to the patient during this period. Patients should drink as much clean water as possible while taking and after consumption of RUTF. If both F100 and RUTF are being given they can be substituted on the basis that about 100ml of F100 = 20g of RUTF.

#### *Quantity of RUTF to give during transition phase, per kg of body weight*

Class of weight (kg)	RUTF (Plumpy'nut®)	
	sachet per day	sachets per week
3.0 - 3.4	1 ¼	8
3.5 - 4.9	1 ½	10
5.0 - 6.9	2	15
7.0 - 9.9	3	20
10.0 - 14.9	4	30
15.0 - 19.9	5	35
20.0 - 29.9	6	40
30.0 - 39.9	7	50
40 - 60	8	55

#### **Case study**

Mercy, a 14 months old baby has been brought to the MCH for the routine growth monitoring by her mother. She was born at term weighing 3.1kg. She weighs 5 kg, 62 cm long and has a MUAC reading of 9cm. The mother reports that Mercy received vitamin A supplementation once, at 6 months. Upon examination, you confirm that Mercy has severe acute malnutrition. Describe how you will manage Mercy's case.

### 13.3.6.3 Self-Assessment

1. Define the following terms
  - A. Supplementation
  - B. F75
  - C. F100
2. The following are risk factors for micronutrient deficiency. Which one is not?
  - A. Poor quality diets
  - B. High mortality rate
  - C. Repeated pregnancies
  - D. Increased physiological needs
3. \_\_\_\_\_ requirements increase in pregnancy because of the rapidly dividing cells in the fetus and elevated urinary losses.
  - A. Calcium
  - B. Vitamin a
  - C. Proteins
  - D. Iron and folic acid
4. The following supplements should be provided to during pregnancy (indicate true/false for each)
  - A. Vitamin A
  - B. Vitamin D
  - C. Folic Acid
  - D. Calcium
5. The dosage of vitamin A that should be administered to infants <6 months is
  - A. 10,000 Iu
  - B. 100, 000 Iu
  - C. 200,000 Iu
  - D. 50,000 Iu
6. The ratio of mixing F75 with water is \_\_\_\_\_
  - A. 410G to 1 litre of water
  - B. 205G to 1 litre of water
  - C. 4.1 G to 20 ml water
  - D. 2.05g to 20 ml water

7. Explain why pregnant mothers should be supplemented with folic acid
8. Why is vitamin A supplementation contraindicated during pregnancy?
9. Describe the conditions that will necessitate SAM patient to be moved from stabilization phase to transition phase of treatment.
10. Illustrate the WHO recommendations on vitamin A supplementation in infants and children

#### **13.3.6.4 Tools, Equipment, Supplies and Materials**

- a. Medicines and medical equipment including antibiotics, anthelminitics, minerals and vitamins, NG tubes.
- b. Therapeutic milks (F75, F100) or the ingredients required to produce locally-made milks including combined mineral vitamin mix (CMV).
- c. Anthropometric equipment: height board, salter scales, infant scales, MUAC tapes, baby scales.
- d. Laboratory and diagnostic services is important but not essential.
- e. WHO Guidelines
- f. MOH Guidelines
- g. Stationery
- h. Skills lab
- i. Use of LCDs, video clips, charts and other teaching aids
- j. Invitation of competent expertise
- k. Workplace procedure manuals
- l. Computers with internet
- m. Library and resource centre

#### **13.3.6.5 References**

1. The Kenya National Technical Guidelines for Micronutrient Deficiency Control (2008)
2. <https://cdn2.sph.harvard.edu/wpcontent/uploads/sites/32/2018/04/2016WHOAntenatalCareGuidelines-1.pdf>
3. MOH. (2009). *National Guideline for Integrated Management of Acute Malnutrition*.

## 13.3.7 Learning Outcome 6: Document maternal and child nutrition care

### 13.3.7.1 Learning Activities

Learning Activities	Specific instructions
i) Obtain mother baby booklet	➤ Check weight and height plotting for growth monitoring
ii) Avail MOH registers	➤ Match each MOH register with its purpose

### 13.3.7.2 Information Sheet

#### Definitions

**The Maternal and Child booklet;** a hand book containing information on safe pregnancy, delivery and child health; and meanwhile serves as a health record.

The Maternal and Child Health Booklet is a revised version and combination of the Antenatal card and Child Welfare Card. The first part contains the mother's full antenatal and post natal profile:

- i) ANC
- ii) Postnatal
- iii) Second part contains the child's details on immunizations and other services delivered to a child before age 5 years that will be detached from the booklet.

In case of multiple deliveries the health worker should initiate a booklet for each child. The health worker is advised to be extra careful while filling the information in the booklet by ensuring that correct information is recorded in the appropriate spaces provided. The growth monitoring charts should be marked progressively as the child grows. Health workers are advised to share the information pertaining to the child with the mother or care taker.

Mother & Child Health Booklet was developed to help relate mothers' obstetrical history to infants' healthcare providers to facilitate follow-up and timely management.

Pregnant women receive the Mother & Child Health Booklet at their first antenatal care (ANC) visit, use it for home reference, and share information with families during pregnancy and child rearing. For healthcare personnel, the booklet is a critical health record, documenting and monitoring the services provided, a point-of-care information resource enhancing clinical decision-making ability, and helping clients understand takeaway messages.

The booklet contains information on the mother's pregnancy, delivery and postpartum course and her child's growth and development, immunization, nutrition and other data need to monitor the child to 5 years of age. It replaced three separate record clinical cards. . It ensures continuity of care and provides health education to parents. As such it has proven to be an effective tool in promoting and protecting the health of mothers and children.

The components of maternal & child health include:

- i) maternal care during pregnancy and childbirth (tetanus toxoid injections; ANC appointments; professional delivery care);
- ii) childcare (vitamin A intake);
- iii) feeding practices (exclusive breastfeeding for 6 months, complementary feeding after 6 months); and
- iv) anthropometric measurement of child and mother- hence used as an instrument for growth monitoring

### MOH registers

The ministry of medical services has the following data collection and reporting tools which are used during maternal, infant and child health care;

a) Registers

Antenatal Care Register	MOH 405
Child welfare clinic Register	MOH 511
Family planning service Register	MOH 512
Maternity Register	MOH 333
Immunization permanent Register	MOH 510
Post natal Care Register	MOH 406

b) The ministry also does have **summary forms** such as Immunisation services uptake summary (MOH710) and Integrated Reproductive and Child Health Summary (MOH 711).

c) Tally sheets that are used in the MCH clinic include

- i) OPD summary for under 5 years (MOH 701A)
- ii) OPD summary for over 5 years (MOH 701B)
- iii) Immunisation tally sheets (MOH 702)
- iv) CHANIS Tally sheet (MOH 704)

### GENERAL GUIDELINES FOR FILLING THE SUMMARY FORMS:

1. The first step in completing data reporting forms is to ensure that all the identification particulars are filled in before completing the particular form. These are the names of the province, district, constituency, facility and the period for which the report is covering.
2. Specific ages should be reported within the appropriate age classification.
3. In forms where data is disaggregated by sex, the appropriate data should be filled in the correct column or spaces provided.

4. Care must be taken to separate new or first visits and re-visits or re-attendances. . Note: New or first visit –these are patients/clients who come to your facility for the First time. While Revisit or Re-attendance- these are patients/clients who make subsequent return visits after the first visit.
5. Where there is a provision to show totals, they MUST be aggregated.
6. While making entries in the forms, accuracy MUST be maintained to avoid errors or transposition of figures.
7. While reporting, completeness MUST be observed. No spaces should be left blank and no dashes. You are instead encouraged to practice zero reporting.
8. The name of person preparing the report, the date the report is being completed and the commitment signature MUST be filled in.
9. Once the reports are completed, they are supposed to leave your facility before the 5th of the following month to the District Health Information System (DHIS).
10. At the district, once all the reports from the health facilities have been received, summaries should be promptly made.
11. The district MUST maintain a checklist of all reports and all facilities and check the reports against the facilities to ensure completeness and timeliness.
12. Using a copy of the summaries made, districts MUST analyze and share the information at their level.
13. Districts should submit the summaries to the province or national level on or before 15th of the following month and give feedback to the health facilities. Health Sector Indicator and Standard Operating procedures manual for Health workers May 2008 57
14. The province collects all the district reports, make copies (manual or electronic) do the analysis and use the information as they make arrangement to transmit the summaries to the national level before 21st of the following month if data flows through the province inform of hard copies.
15. Likewise, provinces should make and maintain a checklist of the reports and districts to ensure timeliness and completeness. They must give feedback to the districts and share the report at that level.
16. To maintain accuracy in recording data collected through tally sheets, health workers should tally from the registers on daily basis.
17. The national level data repository (HIS) should acknowledge receipt, process and analyze the data and give feedback to the lower levels and share the information horizontally and vertically.
18. All levels are encouraged to prepare annual reports that will encompass all activities, outputs and in-puts.
19. For communicable diseases that are for immediate reporting, such should be reported without further delay using the appropriate tools and channels for example using case based investigation forms.
20. Using the File Transfer Protocol (FTP), the district should upload their data to the FTP site on or before 15th of the following month.

### **How to handle the tally sheets**

Tally sheets are working sheets on which data is recorded to facilitate ease of count at the time of making summaries. Proper understanding of the content of each tally sheet is essential. The proper way of making a tally is to slash a zero with forward slash (Killing one zero at a time) for example 0 Tallies are normally made immediately a clinician is through with a patient/ client before attending to the next and at the end of the day or early next morning from the register. This depends on circumstances at the facility.

### **How to handle the Summary sheets**

Summary sheets will be completed at the end of the specified period, either from tally sheet or registers or any other source documents. As the health facility submits the summaries to the next level, a copy must remain in the health facility.

For more details on and samples of the data collection and reporting tools, visit [http://publications.universalhealth2030.org/uploads/moh\\_health\\_indicator\\_manual\\_2008.pdf](http://publications.universalhealth2030.org/uploads/moh_health_indicator_manual_2008.pdf)

### **13.3.7.3 Self-Assessment**

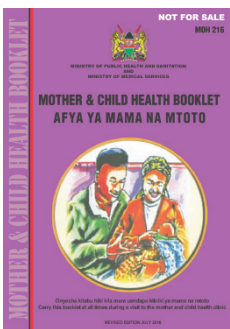
1. What do you understand by the term tally sheet?
2. The following details are found within section 1 of the mother and child health booklet (indicate true/false)
  - A. Anc
  - B. Delivery
  - C. Postnatal care
  - D. Child's details on immunization
3. Match the following MOH registers with their titles

MOH 511	Maternity register
MOH 510	Antenatal Care register
MOH 333	Child welfare clinic register
MOH 405	Immunization permanent register
4. \_\_\_\_\_ is the tally sheet found in the MCH department which covers the OPD summary for over 5 years
  - A. MOH 701A
  - B. MOH701B
  - C. MOH 702A
  - D. MOH 702B

5. Once reports are completed, they should leave the specific facility to;
  - A. DHIS
  - B. MOH
  - C. Office of director of medical services
  - D. Archives
6. State the components of maternal and child health booklet
7. Which is the first step in completing data reporting forms?
8. Discuss how tally sheets are handled

#### ***13.3.7.4 Tools, Equipment, Supplies and Materials***

1. WHO guidelines
2. MOH guidelines
3. Stationery
4. Skills lab
5. Use of LCDs, video clips, charts and other teaching aids
6. Invitation of competent expertise
7. Workplace procedure manuals
8. Computers with internet
9. Library and resource centre
10. Mother and child health booklet



Various MOH registers

Tally sheets

Sample summary sheets



### **13.3.7.5 References**

1. <http://www.mchhandbook.com/mchhandbooks/>
2. <http://kenbright.co.ke/downloads/Mother%20%20Child%20Health%20Handbook%20MOH%2016032017.pdf>
3. <https://academic.oup.com/jpubhealth/article/41/1/170/4793391>
4. [http://publications.universalhealth2030.org/uploads/moh\\_health\\_indicator\\_manual\\_2008.pdf](http://publications.universalhealth2030.org/uploads/moh_health_indicator_manual_2008.pdf)

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